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# The Journal of APPLIED PSYCHOLOGY

JAMES P. PORTER, EDITOR
Ohio University
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# MECHANICAL, PHYSICAL, AND MUSICAL ABILITY OF THE NATIVE RACES OF ALASKA

WALTER CROSBY EELLS
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## INTRODUCTORY

In a previous article dealing with the mental ability of the native races of Alaska[1] a general account was given of the survey of the educational system of the territory conducted by Dr. H. D. Anderson and the writer.[2] The reader is referred to the introduction to that article for a general description of the testing program, its methods and limitations, and the adequacy and nature of the sampling. This article will be devoted to a summary of some of the more significant findings regarding the mechanical, physical, and musical abilities of over one thousand children of the Eskimo, Aleut, and Indian races—the three native races which make up over half of the population of Alaska.

[1] Walter Crosby Eells, "Mental Ability of the Native Races of Alaska," Journal of Applied Psychology, August 1933, Vol. XVII, p. 417.

[2] H. Dewey Anderson and Walter Crosby Eells, *Federal Education in Alaska: A Study of the Administrative, Curricular, Economic, and Sociological Aspects of the Work of the United States Government for the Eskimo, Aleuts, and Indians of Alaska, 1930-1932.* Made under the auspices of the School of Education of Stanford University, at the request of the United States Office of Education, supported by a grant from the Carnegie Corporation of New York. Mss. of 1662 pages. Available in library of Stanford University and United States Office of Education, Washington, D. C. To be published by Stanford University Press. Dr. Anderson was Director of the Survey. The writer was Associate Director and especially responsible for the testing program.

## MECHANICAL ABILITY

The instrument selected to give a general measure of mechanical ability was the MacQuarrie *Test for Mechanical Ability*, a group test for which only paper and pencil are needed.[3] No linguistic ability is required to perform the prescribed tasks, but this element is involved in the instructions for doing them. To this extent, therefore, it may be somewhat unfair when used with races for which, as already indicated, there is distinct evidence of linguistic handicap.

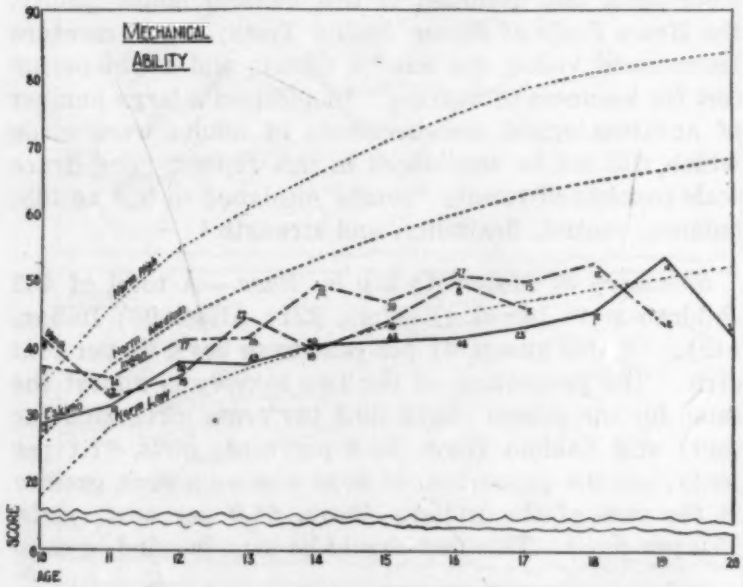
*Summary.*—A total of 591 children were tested (Eskimo, 299; Aleut, 112; Indian, 180). Of the group, 40 per cent were boys, 60 per cent girls. The proportion of the two sexes was almost the same for Aleuts (boys, 37.5 per cent; girls, 62.5 per cent) and Indians (boys 38.5 per cent; girls, 61.5 per cent) but quite different and more nearly normal in the case of the Eskimo (boys, 45.6 per cent; girls, 54.4 per cent). This fact should be kept in mind in comparing the total ability shown by the three races. A summary of results is shown in Figure I, the number of cases at each age level for each racial group being indicated. The author of the test provides three types of age norms, high, medium, and low as indicated by the dotted lines. The medium norm is the median of about one thousand cases, the others are one standard deviation above and below the median. The small groups at the ten-year level seem to show rather definite superiority for all three races, but from 11 to 14 years of age all three are distinctly inferior to the medium norm,

[3] Considerable statistical evidence has been produced to show that the MacQuarrie test is a satisfactory measure of general mechanical ability. The author states that reliability is 0.90, that the correlation with intelligence is very low, and that it predicts mechanical ability to the extent indicated by a correlation of 0.65 or better with shop teachers' ratings of pupils as a criterion.

although somewhat superior to the low norm. The Aleuts and Indians maintain approximately the same positions for higher age levels, but the Eskimo drop even below the low norm for those 15 years of age and older. Perhaps the difficulty of understanding directions correctly has modified the scores somewhat, especially in one or two of the subtests of the MacQuarrie series, but even if some allowance is made for this handicap, there is little reason to suppose that any of the three races show distinct mechanical ability.

FIGURE I

*Mechanical Ability of Eskimo, Aleut, and Indian Children by Chronological Age, as Measured by the MacQuarrie Test of Mechanical Ability*




A few children, however, secured very high scores on this test. Normally 16 per cent of children should exceed the high norm. For the Eskimos 2 per cent exceeded

this norm; for the Aleuts, 7 per cent; for the Indians, 7 per cent.

*Sex Differences.*—In the preceding summary the scores for the two sexes have been combined. In Figure II they are reported separately for each race and sex. In each case it will be noted that the scores for girls are higher in the earlier years, those for boys in the later years. In no case, however, beyond the eleventh year does either sex exceed the medium norm. Marked and significant consistent sex differences are nowhere found.

## Physical Ability

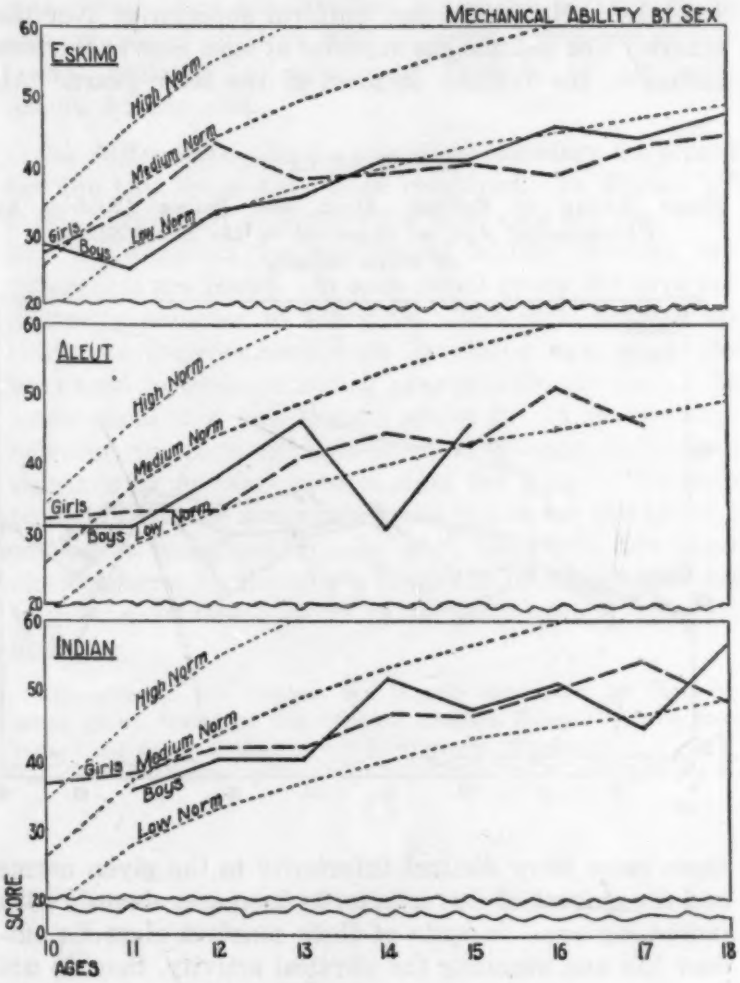
Three different types of measures of physical ability were used, one designed to test general motor ability, the Brace Scale of Motor Ability Tests; one to measure keenness of vision, the Snellen Chart; and a whispering test for keenness of hearing. In addition a large number of anthropological measurements of adults were made which will not be considered in this report. The Brace scale consists of twenty "stunts" designed to test agility, balance, control, flexibility, and strength.[4]

*Summary of Motor Ability by Race.*—A total of 463 children were tested (Eskimo, 221; Aleut, 93; Indian, 149). Of this group, 41 per cent were boys, 59 per cent girls. The proportion of the two sexes was almost the same for the Aleuts (boys, 39.8 per cent; girls, 60.2 per cent) and Eskimo (boys, 38.9 per cent; girls, 61.1 per cent), but the proportion of boys was somewhat greater in the case of the Indians (boys, 45.0 per cent; girls, 55.0 per cent). This fact should be kept in mind in com-

[4] The data used in standardizing the scale were obtained from an examination of over 1500 students from the fourth grade through college. Reliability may be estimated as 0.77; correlation with success in combinations of athletic events, 0.90; correlation with intelligence practically zero.

FIGURE II

*Mechanical Ability of Eskimo, Aleut and Indian Children, by Sex*

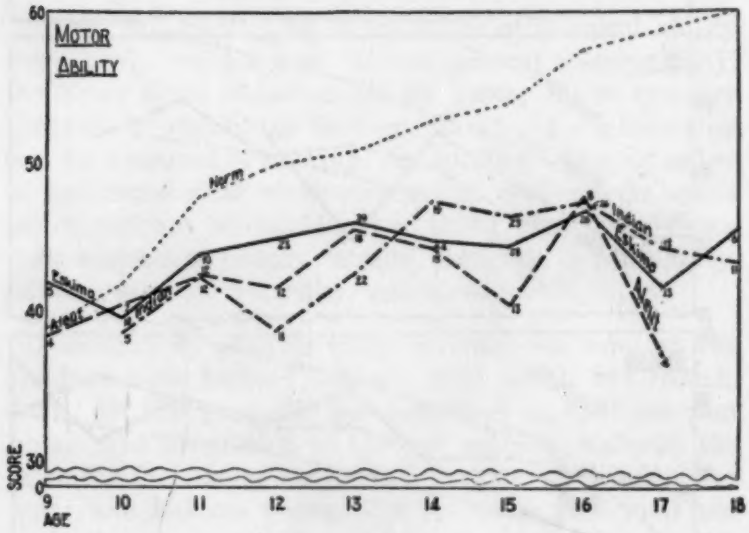


paring total ability shown by the three races since there are distinct sex differences.

A summary of results is shown in Figure III, the number of cases at each age level for each racial group being indicated. No race shows uniform superiority over the others. The Eskimo are superior at ages nine to thirteen inclusive, the Indians at most of the later years. All

FIGURE III

*Motor Ability of Eskimo, Aleut, and Indian Children by Chronological Age, as Measured by the Brace Scale of Motor Ability*




three races show distinct inferiority to the given norms and the amount of this inferiority increases steadily with increasing age. In spite of their constant rigorous outdoor life and necessity for physical activity, they do not show nearly the physical agility, balance, control, flexibility, and strength of white children of similar ages in the States.

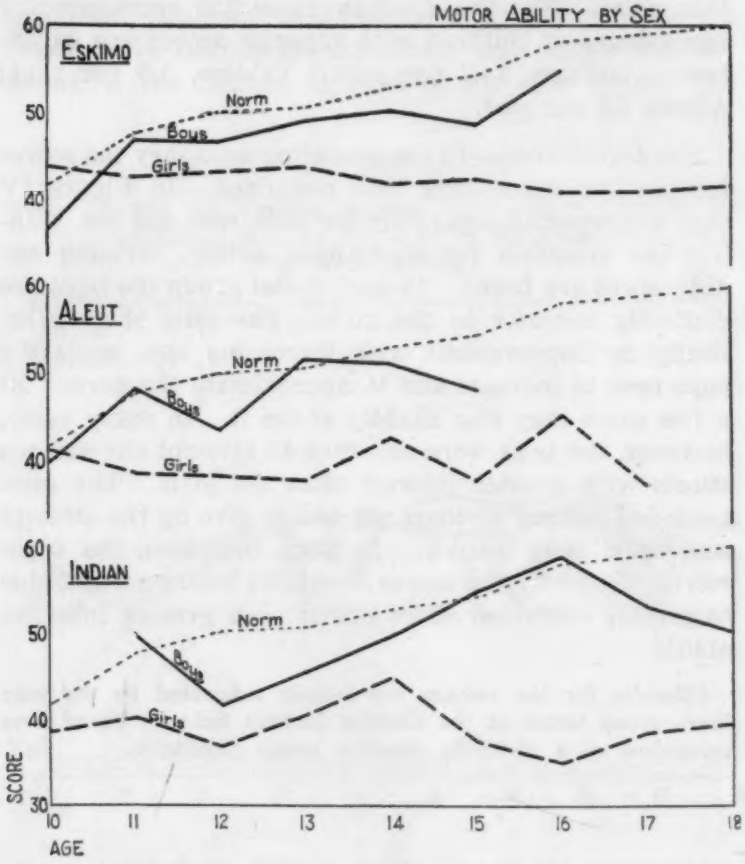
The author of the scale indicates that a score of over 60 should be interpreted as very superior, although obviously this will vary somewhat with age. Approximately 16 per cent of white children have scores above this point. For the Alaskan races the corresponding percentages of children with superior scores are as follows: Indians, 14.2 per cent;[5] Eskimo, 4.5 per cent; Aleuts, 3.2 per cent.

*Sex Differences.*—In the preceding summary the scores for the two sexes have been combined. In Figure IV they are reported separately for each race and sex. Unlike the situation for mechanical ability, striking sex differences are found. In each racial group the boys are distinctly superior to the girls. The girls show practically no improvement with increasing age, while the boys tend to increase and to approximate the norm. In a few cases they rise slightly above it. In many cases, however, the boys were observed to attempt the various stunts with greater interest than the girls. The girls tended to become discouraged and to give up the attempt somewhat more quickly. In part, therefore, the superiority shown by the scores should be interpreted as due to greater sustained effort rather than greater inherent ability.

[5] Results for the Indians are largely influenced by the very large group tested at the Sheldon Jackson School. These were recognized as a distinctly superior group physically.

FIGURE IV

*Motor Ability of Eskimo, Aleut, and Indian Children, by Sex*



*Vision.*—The results of tests of vision with the Snellen chart are summarized in Table I.

TABLE I

*Eyesight of Native Alaskan Children in Comparison with American White Children*

| Group | Number | Per cent Normal to Superior | Per cent Subnormal | Per cent Poor |
|---|---|---|---|---|
| American Whites[6] | 10,000 | 63.0 | 27.0 | 10.0 |
| All natives | 371 | 59.0 | 40.2 | 0.8 |
| Eskimo, Pure Blood | 240 | 57.9 | 41.7 | 0.4 |
| Eskimo, Mixed Blood | 31 | 61.7 | 38.3 | 0.0 |
| Aleuts | 35 | 51.4 | 45.7 | 2.9 |
| Indians | 65 | 66.2 | 32.3 | 1.5 |

The proportion of children with normal or superior vision is only slightly less than that of American children. Very few of the subnormal group, however, were classified as "poor" whereas 10 per cent of the American children were included in that designation. The most significant fact is that over 40 per cent of the children sitting in school and studying day after day under the glare of gasoline lamps in the short winter days of Alaska have weak or subnormal vision usually uncorrected by glasses.

*Hearing.*—In the whisper test, given to 169 native children, 153 of them Eskimo, 57 per cent were classified as normal or superior in hearing, 39 per cent as slightly below normal, and 4 per cent as having decidedly weak or bad hearing. A somewhat similar study in the United States showed 68 per cent with normal or superior hearing.[7]

[6] United States Public Health Report, Vol. 39, No. 48. (Nov. 18, 1929.)

[7] United States Public Health Report, December, 1929.

## Musical Ability

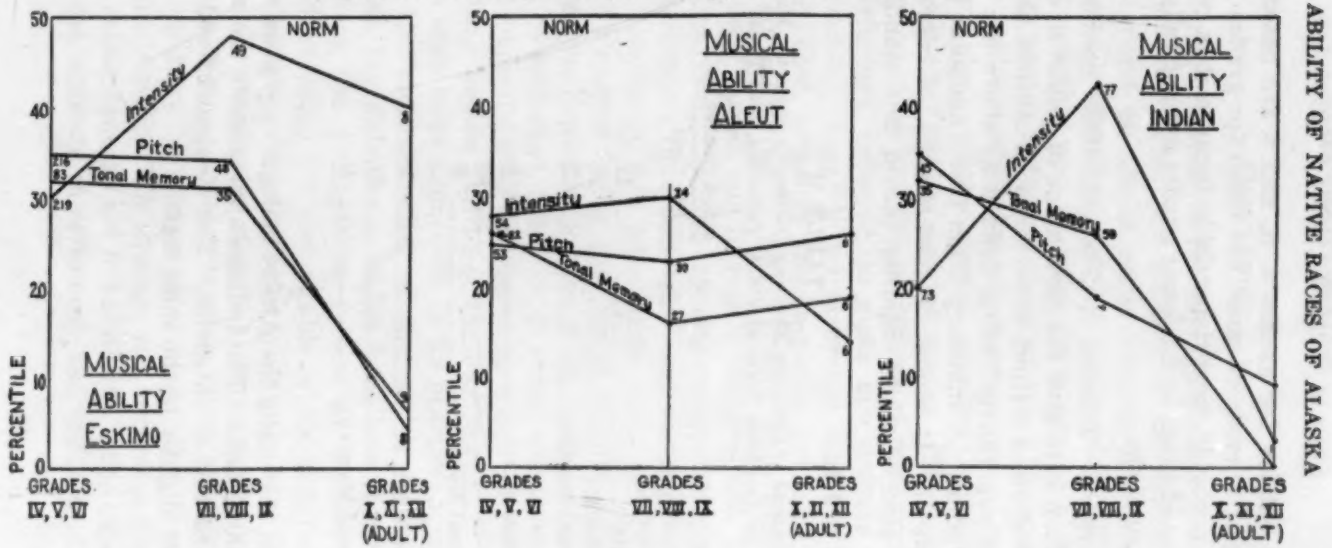
The Seashore Measures of Musical Talent were selected as the best instruments for measuring musical ability. Since time did not permit the use of the entire set, sense of pitch, sense of intensity, and sense of tonal memory were selected because of their higher reliability and because the qualities they were designed to measure seemed to be particularly fundamental.

*Summary of Results.*—The Seashore tests were given to 551 native children, 286 Eskimo, 103 Aleuts and 162 Indians.[8] A summary of the results for the three races at each of the three grade levels for which norms are given is shown graphically in Figure V. Grade norms are given for three levels only—fifth grade, eighth grade, and adult and interpolation is suggested for intermediate grades. In each case the percentile score of the median of the group is given. Definite inferiority for all three races in each test is shown at every grade level. The number of cases above the ninth grade level is too small to be of much significance. In grades four to nine, however, the median performance for the Eskimo is only about the 35 percentile point; for the Aleuts about the 25 percentile point; and for the Indians about the 30 percentile point.

[8] The author of the test states that scores below 35 per cent on tonal memory and below 55 per cent on other tests cannot be ranked. It was necessary to exclude only a few scores on this account in the tests of pitch and intensity, but a large number of those in the test of tonal memory. While the tests themselves are non-linguistic in character, the instructions for understanding them and for recording judgments are somewhat complex and easily confusing. The requirement that all record their responses at the same rate proved difficult for some of those of naturally slow reaction. If the place was lost early in the test it was impossible to find it again. In spite of repeated trials and an effort to explain the desired procedure it was felt that in many cases some of the children failed to grasp fully the verbal instructions. This was especially true in the test of tonal memory.

FIGURE V

*Musical Ability of Eskimo, Aleut, and Indian Children, as Measured by the Seashore Tests of Pitch, Intensity, and Tonal Memory*



The entries for grades 4, 5, and 6 are based upon the largest number of cases, but those for grades 7, 8, and 9 are probably most dependable because it is certain that many of those in the lower grades did not fully grasp the instructions.

*Superior Musical Ability.*—Another method of comparison is to give the percentage of pupils in each group who showed distinct superiority in musical ability, "distinct superiority" being defined as above the 75-percentile point. A summary from this standpoint is given in Table II. It should be remembered, of course, that 25 per cent of white children exceed this standard.

TABLE II

*Percentage of Children Showing Distinctly Superior Musical Ability on Seashore Tests of Pitch, Intensity, and Tonal Memory*

| | 4, 5, 6 Grades | 7, 8, 9 Grades |
|---|---|---|
| | Per Cent | Per Cent |
| *Eskimo* | | |
| Pitch | 11 | 10 |
| Intensity | 28 | 29 |
| Tonal Memory | 4 | 9 |
| *Aleuts* | | |
| Pitch | 6 | 0 |
| Intensity | 16 | 6 |
| Tonal Memory | 5 | 0 |
| *Indians* | | |
| Pitch | 4 | 6 |
| Intensity | 21 | 25 |
| Tonal Memory | 0 | 15 |

On this basis the Aleuts make a very poor showing in all three tests. The Indians approximate the white norm in the test of intensity. The Eskimo exceed the white norm slightly in the same test.

## CONCLUSION

The material presented in this and the preceding article throws much light upon the question of the abilities of the native races of Alaska along various fundamental lines—mental, mechanical, physical, and musical. It contains no proof that any of these races are as a whole superior by nature to the members of the white race in any of the qualities which have been measured. There is no uniformly clear evidence even of equality. On the other hand there is some evidence of inferiority. The number of cases is too small and the conditions of measurement too unsatisfactory, however, to make any definite final pronouncements. There is no assurance that the tests which were used, probably the best ones available, are entirely fair measures of peoples with such different racial, cultural, social, and linguistic backgrounds. Much additional careful scientific measurement, with more refined instruments than now exist, and under carefully controlled conditions, will have to be made before any authoritative answer to the question of relative amounts of these various capacities can be given with confidence. The evidence presented, however, is much more comprehensive and specific than has heretofore existed regarding these little known natives of the Far North.

Possibly even more significant in its practical implications for the reorganization of the native schools of Alaska than the differences which have been found to exist between the averages of groups of Eskimo and Aleuts and averages for comparable white children, is the great variability in each factor within the race itself. The average is a necessary statistical device for handling such masses of data as are treated in these articles and for reducing them to comparable form. But there is danger sometimes that the average will become a stumbling block rather than an aid to knowledge. The capabilities and the ultimate development and welfare of the

individual child must not be concealed permanently in a statistical average. One value of the tests used in Alaska has been the discovery of the exceptional as well as the average native child. There are many Eskimo and Aleut children who are distinctly superior in measured mental, musical, physical, or mechanical ability (even though handicapped perhaps by unfamiliar types of tests) to many white children.

The tests which have been used, for example, have revealed the existence of a part Eskimo girl and of a part Aleut boy with intelligence quotients of 127—showing greater mental ability than that possessed by 98 per cent of white children. They have shown an Eskimo girl with more mechanical ability than 84 per cent of American children in the same grade; and several Indian boys with greater mechanical ability than is possessed by 98 per cent of American children. They have shown two Eskimo boys and one Aleut boy who score higher on a comprehensive test of motor ability than 98 per cent of white children. They have found four Eskimo children and one Aleut who score higher on at least one of the tests of musical ability than 99 per cent of white children. These and other similar children in the schools where it was not possible to give the tests merit special consideration. They can be trained for future leaders of their races.

Educators in the States are only beginning to realize the practical educational implications of "individual differences," which standard tests have helped so much to establish in incontrovertible terms, and to develop differentiated curricula which shall take practical account of these marked individual differences. Similar adjustments and adaptations, if not greater ones, must be made in the Alaskan native schools before they satisfactorily conform to the great variations in ability which this investigation has shown exist in the children who are attending them.

# INTERCORRELATIONS AMONG METABOLIC RATE, VITAL CAPACITY, BLOOD PRESSURE, INTELLIGENCE, SCHOLARSHIP, PERSONALITY AND OTHER MEASURES ON UNIVERSITY WOMEN

JAMES R. PATRICK
and
EMMETT ROWLES
*Ohio University**

## ORIENTATION

Patersôn[1] in his recent book has given an excellent review of the literature on the relation between physique and intellect. Harris[2] et al. in a recent work have published some correlational studies of man in his relations to his physical and biological environment. In reading the literature on this subject one is impressed by the number of studies having to do with the relation between morphological measures and intelligence; nevertheless one feels the lack of studies made between bio-chemical and physiological measures as they are related to intelligence and personality. As Paterson's survey brings out, the quantitative data demonstrate "that the prevalent notions regarding the intimacy between physical traits and intellect have been greatly exaggerated. Search in the realm of gross anatomy for a physical correlate

* The writers are of the Psychology and Biology Departments, respectively.

[1] Paterson, D. G., *Physique and Intellect.* The Century Co., New York, 1930.

[2] Harris, J. A., *et al., The Measurement of Man.* The Univ. of Minn. Press, 1930.

of intellect has yielded uniformly negative results. It appears that such structural characteristics as height and weight are correlated only slightly with intelligence, as narrowly defined."[3]

Another fact brought out in Paterson's review is that even physical defects and pathological glandular conditions do not correlate highly with mental normality or mental deficiency. Yet in spite of these negative results one feels that Paterson is right when he says that, "In a naturalistic world one cannot conceive of intellect existing apart from the physical body; but this conception does not imply that gross anatomy is the physical basis of intellect. Attention must be shifted from structural characteristics as height, anatomical development, dentition, bodily build, and even size and shape of head, to the central nervous system, especially the cortex cerebri."[4] We accept Paterson's statement in general but we shall return to it later in this paper.

The reader's attention has been called to the best survey of literature available on the subject of the relationship between structure, intellect and temperament; without attempting to recapitulate that literature here we shall call attention to only a few studies which bear directly upon our study—statistical relationships between certain physiological and psychological functions.

G. B. Rich[5] working with Chicago University students obtained ratings of such personality traits as good naturedness, perseverance, leadership, aggressiveness, and excitability; with these traits he correlated certain bio-chemical phases of metabolism as found in the urine and saliva. From the results he concludes, "The least

[3] Paterson, *op. cit.*, p. 269.

[4] Paterson, *op cit.*, p. 273.

[5] Rich, G. J., "A Bio-chemical Approach to the Study of Personality," *Jour. of Abn. and Soc. Psychol. 23*, 1928-29, 158-175. See also Rich, "Body Acidity as Related to Emotional Excitability," *Arch. of Neur. and Psychiatry 20*, 589-594.

excitable individuals tend to have the most acid urine and saliva, while the most excitable persons tend toward neutrality or alkalinity of their fluids." Again, "Emotional excitability tends to bear inverse relationship to the presence of creatinine in the blood and its excretion in the urine." While Rich's correlations were low—ranging between .20 and .30—they were consistently positive. The personality ratings were obtained by having several persons who knew the subjects rate them.

A. H. Turner[6] in a comparative study of "Vital Capacity of College Women" from several institutions concludes that of "students of high and low vital capacity indicate that students of low vital capacity are inferior to those of high capacity as shown by their past and present medical records." No examination was made to see if students with low vital capacity were among the ones with inferior (superior) scholastic records. His subjects were chiefly Wellesley and Mt. Holyoke students.

W. H. Sheldon[7], claiming to have previously found some slight relationship between bodily measures and social traits, studied University of Chicago students with regard to "Social Traits and Morphologic Types." The social traits were the ones used by Rich, previously mentioned. Morphologic measures such as "length of upper and lower extremities," "sternum length," "transverse thoracico-diameter," etc., were used. Among his conclusions are found the following statements: "Certain relationships were found between morphologic measurements and social traits. These are slight, as measured by the coefficient of correlation, but they are too high and too numerous to be due to chance." Again, "On the whole, the factor of general size, or bigness seems to be related positively to at least sociability, leadership

[6] Turner, A. H., "Vital Capacity of College Women," *Am. Physical Educ. Review, 32*, 1927, 593-606.

[7] Sheldon, W. H., "Social Traits and Morphologic Types," *Personnel Jour. 6*, 1927-28, 47-57.

and aggressiveness." One is reminded here of Kretschmer's[8] types, such as asthenic, being related to dementia praecox; and pyknic, being related to manic-depressive conditions.

F. R. Rogers[9] emphasizes the dynamic as over against the static measures when he claims from his study that "The least accurate physical capacity test—lung capacity —is nearly 50 per cent more accurate a measure of general athletic ability than the most accurate static measure obtainable—height (age, size, etc.)."

Garrett and Kellogg[10] in studying physique as it is related to general intelligence, social intelligence and emotional stability on Columbia University students conclude, "Small and unreliable correlations ranging from .051 and .101 (for Ht/Wt) and from –.055 and .074 (for M.I.)* were obtained between Ht/Wt, M.I. and the other three variables." The other three variables were, of course, general intelligence, social intelligence, and emotional stability.

A. I. Gates[11] attacked the problem of the relation between physical, mental, physiological, social, and emotional maturity in children. Using 115 boys and girls of Junior Primary and Fourth grade levels in the schools of New York as subjects he correlated such measures

*M.I. = Morphologic Index; Garrett and Kellogg's index is derived from the one used by S. Naccarati in his studies along that line.

[8] Kretschmer, E., *Physique and Character.* Harcourt Brace & Co., New York, 1925.

[9] Rogers, F. R., "Physical Capacity Tests in the Administration of Physical Education." Contributions to Ed. No. 173. Teachers College, 1925.

[10] Garrett, H. E., and Kellogg, W. N., "The Relation of Physical Constitution to General Intelligence, Social Intelligence, and Emotional Stability." *J. of Exp. Psychol. 11*, 1928, 113-129.

[11] Gates, A. I., "The Nature and Educational Significance of Physical Status and Mental, Physiological, Social and Emotional Maturity," *The Jour. of Educ. Psychol. 15*, 1924, 329-258.

as anatomical traits (ht., wt., ossification of wrist bones, etc.), physiological functions (lung capacity, heart beat, etc.), emotional maturity (measured by rating technique), social maturity (estimated), mental age, and scholastic achievement. He concludes, "mere physical status of maturity, . . . . however adequately measured, does by no means gauge mental, educational, social or emotional maturity satisfactorily."

Dorothy Beise[12] examined the reliability and validity of certain physical tests and compared her results with the established reliabilities of various intelligence tests. The physical measures were strength of grip, vital capacity, heart rate (radial pulse) and a test of heart reaction to exercise as indicated by return of pulse to normal. While the validity of the tests studied, as related to her criteria, showed a low order of correlations, yet the coefficient of reliability for vital capacity was .87±.005 and for strength of grip .81±.03. The coefficients of reliability for the other two measures were low.

Enough has been said to show the trends of the results bearing upon our study. We shall now turn to our own work.

## Problem

An examination of the literature reveals that no study yet has been made which examines the relationship between basal metabolism and various other physiological and psychological functions. Then, too, while some attempt has been made to find the relationship between emotional stability and physique, no one has shown the relationship between objective standardized personality scores as they are related to some of our other measures of a physiological and psychological nature. It is the

[12] Beise, Dorothy, "The Reliability and Validity of Certain Physical Tests Compared with the Reliability and Validity of Mental Tests." A Master's Thesis on file in Ohio State University Library done under the direction of Dr. James P. Porter.

present investigators' aim to show by statistical procedure the inter-relations between the following variables: basal metabolism, blood-pressure (systolic and diastolic), vital capacity, strength of grip, intelligence, point-hour-ratio, personality scores and age. The above mentioned problem grew out of the writers' cooperation with the Home Economics Department in giving basal metabolism tests to women students in the dietetic classes in Ohio University.

## Technique and Procedure

*Basal Metabolism.* To measure the basal rate the Benedict-Roth metabolism apparatus was used. This instrument measures $0_2$ consumption for a 10 minute period. Four basal tests were taken under controlled conditions; two tests were taken on a given morning in a week followed by two other tests the week after. The lowest of these four tests was considered the basal and that determination used. Aub-DuBois norms furnished the standards.

*Blood-Pressure.* Blood-pressure readings by means of a Tycos Sphygmomanometer (Auscultatory method) were taken just after the metabolism tests were made. The blood-pressure measures used here were the ones corresponding to the metabolism determinations.

*Vital Capacity or Index of Health.* Vital capacity was measured by means of a Spirometer.* Three trials were given each subject during one experimental period and the largest of these measures used. The figures used in these correlations, however, are index numbers. The number is derived from the formula, $\frac{Ch^n}{V.C.} = K$. This is

* The spirometer was manufactured by Warren E. Collins. The factors were controlled as mentioned by C. H. McCloy in his paper, "On Using the Spirometer as an Instrument of Precision," *Am. Physical Educ. Review*, May Issue, 1927.

Dreyer's formula and shows the relationship between the circumference of the chest and vital capacity. This formula holds when $n$ is approximately 2 and $K$ equals 1.82 for a condition of perfect health.

*Strength of Grip.* To measure the strength of grip the Smedley hand dynamometer was used. After instructing the subject how to use the dynamometer two tests were made on each hand, left and right. The largest measure for each hand was taken and both averaged. The average was the measure used.

*Intelligence.* Percentile scores from the Ohio State University college entrance examination were used. Since students from all classes are used in this study and since several forms of the O. S. U. test are out some interpolation was necessary. However, most subjects had taken Form 17.

*Point-Hour-Ratio.* The point-hour-ratio represents the scholastic achievement in this study. The ratio was obtained by dividing the total number of points by the total number of hours earned. C represents one point, B, two points, and A, three points, in Ohio University.

*Personality Scores.* The personality schedule used was the Clark revision (Willoughby) of the Thurstone Personality Schedule. After all other measures were taken the subjects were called back into the laboratory and the personality scale administered.

*Age.* The age of subjects used was years only.

Fifty-two women from the Home Economics Department in Ohio University served as subjects in this study. They were all in good health and supposedly normal at the time these tests were made.

## Results and Discussions

Table 1 shows the mean age of these subjects to be 21.1 years with a $\sigma$ of 2.6. This fact is significant for age and sex are important factors in metabolism rates. Our subjects are of one sex (female) and are homogeneous not only in age and selection (college students) but also in interests, since all are Home Economics students. This table shows both systolic and diastolic blood-pressure to be about normal for this age. The mean systolic is 112.1, that of diastolic 70.8. The percentile

TABLE I

*Showing Means and Standard Deviations of Measures**

| | Age | BP (dias.) | Per. Scores | Intell. | PHR | BP (sys) | K (V.C.) | Grip | BMR |
|---|---|---|---|---|---|---|---|---|---|
| Mean | = 21.1 | 70.8 | 29.7 | 52.2 | 1.50 | 112.1 | 2.09 | 29.1 | —7.3 |
| $\sigma$ | = 2.6 | 7.1 | 13.8 | 26.7 | 0.51 | 8.4 | 0.55 | 4.67 | 8.97 |

* N = 52 cases in all were used except in personality; only 39 subjects took the personality schedule.

rank mean is 52 but there is a wide variation in intelligence since $\sigma$ is 26.7. In fact, the range in percentile rank is from 5 to 98. This means that the group is a cross section of the student-body in so far as intelligence goes. The same may be said for achievement since the mean ratio is 1.50 with a $\sigma$ of 0.51. The mean of strength of grip is 29.1 kilo-grams with a $\sigma$ of 4.67. The range in this measure is relatively great being from 19.0, the lowest, to 38.5, the highest.

Sir Leslie Mackenzie[13] in his discussion of the "Development of Preventive Medicine and Its Outlook" written for Nelson's Encyclopedia of Medicine quotes Professor Dreyer on vital capacity. Mackenzie claims that "Pro-

[13] *Nelson's Loose-Leaf Living Medicine*, Vol. VII, 1924, pp. 26-27. It was from this reference that Dreyer's formula for Vital Capacity was taken.

fessor Dreyer finds that there are considerable variations of vital capacity in normal individuals of different classes and occupations." Again, "The vital capacity thus becomes an index of the individual's reactions to the environment." If these statements be true then research on vital capacity and health should be fruitful indeed. If when K is 1.82 it represents perfect health then a K of higher value would perhaps represent a less degree of health. Our subjects have a mean K of 2.09 with a $\sigma$ of 0.55.

Willoughby reports that for his revised Thurstone Personality Schedule a median score represents from about 24 at age 17 to about 43 at age 34. The mean score for our group is 29.7 on the personality scale. This would seem to indicate that our subjects tend more toward neuroticism than Willoughby's subjects. However, in this measure, wide variability is found and individual differences are large, just as they have been found to be in the other measures.

The basal metabolism rates for our subjects appear rather low. The mean rate is –7.3 with $\sigma$ of 8.97. The range and variability in basal metabolism rate are great. The lowest basal rate is –25, while the highest is +13.3. It has been claimed[14] that Aub-DuBois norms are about 4 per cent too high for the average but they come nearer taking in all cases than the Harris-Benedict while the latter come nearer fitting the average.

Table 2 shows the intercorrelations and P. E.'s between all measures both physiological and psychological. Fourteen of the 36 correlations are negative. The others are low positive ones. Correlations between age and K (health index) and between diastolic and systolic blood-pressures and between intelligence and point-hour-ratio are positive and reliable but low. Although not reliable, the coefficients of correlation between age and diastolic

[14] DuBois, E. F., *Basal Metabolism in Health and Disease.* Lee and Febiger, Philadelphia, 1924, p. 164.

TABLE II

*Intercorrelations Between All Physiological and Psychological Measures*

| No. | Variables | r | P.E. |
|---|---|---|---|
| 1 | Age with BP (dias.) | .162 | ±.093 |
| 2 | Age with Per. Score | —.105 | ±.105 |
| 3 | Age with Intell. | —.094 | ±.095 |
| 4 | Age with PHR | .211 | ±.091 |
| 5 | Age with BP (sys) | .053 | ±.095 |
| 6 | Age with K (V.C.) | .358 | ±.083 |
| 7 | Age with Grip | .013 | ±.095 |
| 8 | Age with BMR | .001 | ±.095 |
| 9 | BP (dias.) with Per. Score | .131 | ±.105 |
| 10 | BP (dias.) with Intell. | —.016 | ±.095 |
| 11 | BP (dias.) with PHR | —.040 | ±.095 |
| 12 | BP (dias.) with BP (sys.) | .482 | ±.073 |
| 13 | BP (dias.) with K (V.C.) | .220 | ±.091 |
| 14 | BP (dias.) with Grip | .032 | ±.095 |
| 15 | BP (dias.) with BMR | —.001 | ±.095 |
| 16 | Per. Score with Intell. | —.031 | ±.107 |
| 17 | Per. Score with PHR | —.188 | ±.103 |
| 18 | Per. Score with BP (sys.) | —.009 | ±.107 |
| 19 | Per. Score with K (V.C.) | .146 | ±.105 |
| 20 | Per. Score with Grip | .202 | ±.102 |
| 21 | Per. Score with BMR | .110 | ±.105 |
| 22 | Intell. with PHR | .481 | ±.073 |
| 23 | Intell. with BP (sys.) | —.003 | ±.095 |
| 24 | Intell. with K (V.C.) | —.086 | ±.095 |
| 25 | Intell. with Grip | .144 | ±.093 |
| 26 | Intell. with BMR | .011 | ±.095 |
| 27 | PHR with BP (sys.) | —.134 | ±.094 |
| 28 | PHR with K (V.C.) | .084 | ±.095 |
| 29 | PHR with Grip | .056 | ±.095 |
| 30 | PHR with BMR | .051 | ±.095 |
| 31 | BP (sys.) with K (V.C.) | .168 | ±.093 |
| 32 | BP (sys.) with Grip | .096 | ±.095 |
| 33 | BP (sys.) with BMR | .196 | ±.092 |
| 34 | K (V.C.) with Grip | —.076 | ±.095 |
| 35 | K (V.C.) with BMR | —.153 | ±.093 |
| 36 | Grip with BMR | —.056 | ±.095 |

* N = 52 cases in all except personality scores; only 39 took the personality schedule.

blood-pressure, between age and point-hour-ratio, between blood-pressure (dias. and sys.) and K, between personality score and K, between personality score and strength of grip, between personality score and diastolic blood-pressure, between personality score and metabolism and between intelligence and strength of grip are all low but positive. With the exception of the low reliable relationships mentioned above the results of this study indicate that the correlations between the variables used in this study are negligible indeed. These results are in line with many other studies relating morphological measures to intelligence and temperament. While the number of cases is small the trends seem to be indicated.

The writers examined the individual personality scores separately to see if personality, as rated by oneself, would indicate further light between metabolism and blood-pressure and personality. The only thing we found is that the two persons who made the highest personality scores (supposedly more neurotic) also had the lowest metabolism rates.

This leads us to a bit of speculation about these and other statistical measures of this nature from the point of view of methodology. There are certain reasonable expectations about some of these relationships that have not been discussed heretofore. *Over a wide age range* for a given individual one would expect some of these relationships to be greater, either positive or negative, than they have been shown to be. Whether these expectations would hold good for the "measurement of man in the mass" future experimentation will have to show. Some of the close relationships to be expected, *over a wide age range,* are as follows. Between age and blood-pressure one would expect a close relationship, since as a rule blood-pressure increases with age. Between blood-pressure and K (health index) one would expect an increasing negative relationship. We think one may safely say, between personality and K (health index)

one may guess that there would be an increasing negative correlation, other things being equal. Also, between personality and basal metabolism one would expect a greater relationship. Yet in all these cases our measures, taken at a given time, show practically no relationship.

In the light of the above statements then it is a bit surprising to the writers to find such low correlations between certain of these physiological and psychological measures, especially since Rich has found some rather definite trends toward a positive relationship between certain bio-chemical conditions of the body fluids and personality traits. Also, Darrow[15] has found some low positive relationships between blood-pressure and personality constellation groups obtained from neurotic inventory scores. However, most of the literature shows that from *static* measures little relationship between physique, intellect and temperament is to be found. This leads us to a further point about the method of approach in the study of man in his inter-relations. One feels that we may be misled by the small correlations found when we simply take a discrete measure of a function or functions at a given time and attempt to correlate these functions. Morphologic, neural, physiologic and psychologic growth and development are *dynamic* processes. It may be that if structural growth and behavior development are to be really understood one will have to approach from the bio-genetic and psycho-genetic viewpoints and take repeated measurements of a morphologic, physiologic and psychologic nature over a wide age range. Then when we correlate these measures we will see if indifferent and negligible results are obtained. If positive results accrue, then one must say, under certain conditions practically no relationship exists between certain physical and mental traits but if repeated meas-

[15] Darrow and Heath, "Reaction Tendencies Relating to Personality," pp. 92-115, in *Studies in the Dynamics of Behavior* by Lashley, *et al.* University of Chicago Press, 1932.

ures are taken over a wide age range fairly close relations exist. As was pointed out in the literature most studies show no relationship between physique and intellect and yet we believe with Murphey when he says, ". . . . even height, which at a given age is not appreciably correlated with general intelligence, is well correlated with intelligence *over a wide age range* . . . "[16] So perhaps between basal metabolism and personality, in an inverse relationship, between blood-pressure and age, positively correlated, between personality and K or health, between vital capacity and basal metabolism, we may find close relationships.

Of course the individual, other things being equal, fluctuates more or less about a norm for himself in all these functions. Sometimes variability is great. It may be that so long as he stays within his normal range in a physiological way his behavior patterns are not disturbed. It is possible that fine changes in physique and chemique do influence behavior patterns but our measuring rods are not yet refined enough to reveal these influences. We now return to the point quoted from Paterson to the effect that we must look to the nervous system for the explanation of behavior. We agree with Paterson but we must not be unmindful of the conditions under which we get our measures and above all we must not forget that we are dealing with *dynamic* living organisms in which complex relations exist. That the disturbance of a bio-chemical balance over a long period of time may influence the functioning of this nervous system is reasonable to expect. That the only way to get at the true relations between "body" and "mind" functions is to take a bio-genetic and psycho-genetic approach with repeated measures over wide age ranges and to not be contented just to capture a few measures here and there at a given time which may yield only superficial results.

[16] Murphey, Gardner, *General Psychology*. Harper Brothers, 1933, p. 441.

It is possible when this dynamic bio-psycho-genetic approach is taken close relations may be found between structural growth, physiological functioning and psychological development and functioning of behavior patterns and experience.

## SUMMARY

1. Fifty-two women in Ohio University had the following measures taken on them: basal metabolism, blood-pressure (both systolic and diastolic), vital capacity, strength of grip, intelligence rating, personality rating, point-hour-ratio and age.

2. Intercorrelations between the above measures showed practically negligible relationships in all cases except three. Between age and health index (derived from the relation between chest circumference and vital capacity), between systolic and diastolic blood-pressure, between percentile rank and point-hour-ratio there were low reliable positive correlations.

3. Low positive but unreliable correlations were found between personality and strength of grip, personality and health index, personality and basal metabolism, intelligence and strength of grip and between blood-pressure (sys.) and health index. Low but unreliable negative correlations were found between vital capacity and metabolism, between point-hour-ratio and systolic blood-pressure and between personality and point-hour-ratio.

4. It is possible that over a *wide age range* for individuals one would find closer relationships than these and other results show. If this be true then one would have to state under what conditions no correlations are to be found (and under what conditions they will be found) between height and intelligence, between age and blood-pressure and between basal metabolism and

vital capacity and between basal rate and personality, etc. This would necessitate a bio-psycho-genetic approach over a wide age range when certain relationships are sought between morphological, physiological and psychological measures.

# AN EXPERIMENTAL STUDY OF ATTITUDES TOWARD JUVENILE DELINQUENCY

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## I. INTRODUCTION

Juvenile offenses vary in seriousness. Viewed from the individual's standpoint their nature and extent may be symptomatic of a deranged personality or denote a complex of innate factors which predispose to social maladjustment. This point has been emphasized by Healy and Bronner (4) who find a significant relationship between psychopathic personalities and recidivism. Considered from the viewpoint of society the diverse degrees of seriousness in juvenile delinquency may indicate the situational conditions implicit in the problem or the environmental insecurities that give rise to it. Shaw (8) has shown that the amount and character of delinquent acts are associated directly with different regional areas of a city.

A few attempts have been made to devise methods by means of which the type, extent, and intensity of juvenile delinquency can be quantified. Slawson (9) employed two criteria for estimating the degree of delinquency, based upon the number of arrests and severity of the penalty for each offense. Clark (1) constructed a "Scale for Grading Juvenile Offenses," a schedule in which delinquent acts are classified into fourteen groups, graded in terms of seriousness from 1 (least serious) to 10 (most serious). From this scale a "delinquency index" may be computed for any particular offender by comparing actual offenses with samples in the standard

score sheet, assigning a numerical evaluation to each type of delinquency and totaling this series of values. The D. I. (delinquency index) then becomes a measure of the seriousness of any given subject's delinquent behavior. The problem of designing techniques for measuring the seriousness of juvenile acts has been attacked less directly by Cushing and Ruch (3) and Raubenheimer (7), in similar studies, than by investigators already cited. In both of the latter instances a species of the testing approach was utilized. The items of the tests consist of ten descriptions of actual delinquent offenses to be ranked in order of seriousness from 1 (most serious) to 10 (least serious). Material for construction of the tests was drawn, in both studies, from Clark's schedule. By means of these techniques, together with other tests in the total batteries, attempts were made to discover potential delinquency. Symonds (10) has discussed comprehensively the scoring method and statistical procedure used in Raubenheimer's and Cushing's and Ruch's investigations.

Two facts should be noted in the procedures to which reference has been made. In one case the function of the techniques is the diagnosis of the seriousness of actual delinquent careers. This is true of both Clark's and Slawson's approach. The converse is true of devices such as were developed by Cushing and Ruch and Raubenheimer. There is no concern with the practical fact of overt delinquent acts themselves, but rather attention is focused on the extent to which experimental groups of subjects (delinquents) differ in their judgments of the varied seriousness of a series of offenses from control groups (non-delinquents) in relation to a previously devised standard.

A fundamental assumption which underlies all work so far done on the problem of quantifying the varied seriousness of types of delinquent behavior is that on a linear scale for grading from "least" to "most" serious

the increments proceed by equal steps. Such an assumption is open to question in the light of Thurstone's (12) recent contributions to methodology of studying social values. It is with this fact in mind that the present investigation was undertaken.

## II. Problem

Since there is ample doubt as to the adequacy of any scaling method which yields equal-step values for the degrees of gravity of a particular phenomenon, such as juvenile delinquency, it is evident that the primary concern of the present study is the construction of an instrument which will give differential weightings to the different types of delinquent offenses on the principle that the scale separation between some offenses is greater than the distance between others.

The assumption implicit in this experiment is similar to that of Thurstone (14), namely, "offenses arrange themselves in a quantitative continuum from those that seem to be most serious to those that seem relatively least objectionable."

## III. Method

Fourteen delinquencies, drawn from Clark's form, were used as a basis for the development of a scale. The list follows:

| | |
|---|---|
| Arson | Incorrigibility |
| Assault | Larceny |
| Burglary | Malicious Mischief |
| Drunkenness | Murder |
| Forgery | Stealing |
| Highway Robbery | Truancy |
| Immorality | Vagrancy |

These offenses were arranged in 91 pairs according to the formula

$$\frac{n(n-1)}{2} = 91$$

in which every type of delinquent act was paired with every other one.

The participation of 192 individuals was requested in the performance of this experiment divided into four different groups as follows: (a) psychologists whose interests are in the fields of child guidance, personality, and related phenomena; (b) sociologists whose major work is in criminology and social pathology; (c) juvenile judges; and (d) graduate students in education, a majority of whom are administrators or teachers of broad experience. It is obvious that the individuals selected are heterogeneous with respect to training and point of view but homogeneous by virtue of the fact that all contact the problem of juvenile delinquency in some manner or other.

Following are the instructions which were sent to the experimental groups:

AN EXPERIMENTAL STUDY OF ATTITUDES TOWARD JUVENILE DELINQUENCY

The purpose of this study is to ascertain the opinions of a number of people about juvenile delinquency. The following list of delinquencies has been arranged in pairs. You will please decide which one of each pair you think more serious and underline it.

Sample: cheating—lying

If you decided that "lying" is more serious than "cheating" you would underline *lying*, as in the example.

If you find a pair of delinquencies that seem equally serious, be sure to underline one of them anyway, even if you have to make a sort of guess. *Be sure to underline one in each pair.*

* * *

Malicious mischief—Drunkenness
Burglary—Larceny
Forgery—Arson
Vagrancy—Assault
Immorality—Truancy
etc.

With each experimental form was sent a general communication and a list of definitions of delinquent offenses. The latter were taken from Clark's scale for grading juvenile offenses and modified slightly for usage in the present study. One purpose only dictated the inclusion of definitions, stated in the communication to each individual as follows—"to avoid confusion and encourage as much unanimity as possible in interpreting the various types of delinquency." That is, no effort was made to limit the variability which might operate in the case of any given person, but only to indicate the definitive limits of the delinquent acts which were to be compared.

## IV. Statistical Results

Table I shows in detail the response made to the paired comparisons form. Of the 192 individuals asked to participate, 119, or 62 per cent, responded as requested.

TABLE I
*Returns on Paired Comparisons Form*

| Group | Sent | Returned | Per Cent Returned |
|---|---|---|---|
| Psychologists | 78 | 45 | 57.7 |
| Sociologists | 30 | 15 | 50.0 |
| Juvenile Judges | 53 | 28 | 52.8 |
| Graduate Students | 31 | 31 | 100.0 |
| Totals | 192 | 119 | 62.0 |

The basic tables of data which ensue have been treated by the following formula developed by Thurstone (13, 14) and discussed by Symonds (10):

$$S_1 - S_2 = \sqrt{\frac{2}{n}}[\Sigma x_{1k} - \Sigma x_{2k}]$$

in which

$S_1 - S_2$ = scale separation
$n$ = number of values in a column
$\Sigma x_{1k}$ = sum of first column of pair
$\Sigma x_{2k}$ = sum of second column of pair

TABLE II

*Experimental Proportions*

| | Arson | Assault | Burglary | Drunkenness | Forgery | Highway Robbery | Immorality | Incorrigibility | Larceny | Malicious Mischief | Murder | Stealing | Truancy | Vagrancy |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Arson** | | .328 | .269 | .076 | .193 | .496 | .244 | .084 | .076 | .050 | .958 | .076 | .025 | .042 |
| **Assault** | .672 | | .588 | .210 | .555 | .765 | .580 | .244 | .395 | .168 | .975 | .378 | .118 | .160 |
| **Burglary** | .731 | .412 | | .067 | .319 | .756 | .412 | .019 | .185 | .059 | .966 | .101 | .025 | .042 |
| **Drunkenness** | .924 | .790 | .933 | | .908 | .958 | .832 | .412 | .891 | .328 | .975 | .798 | .168 | .168 |
| **Forgery** | .807 | .445 | .681 | .092 | | .840 | .454 | .151 | .143 | .084 | .983 | .151 | .034 | .050 |
| **Highway Robbery** | .504 | .235 | .244 | .042 | .160 | | .294 | .034 | .076 | .025 | .966 | .042 | .017 | .042 |
| **Immorality** | .756 | .420 | .588 | .168 | .546 | .706 | | .185 | .445 | .168 | .983 | .429 | .076 | .193 |
| **Incorrigibility** | .916 | .756 | .891 | .588 | .849 | .966 | .815 | | .689 | .529 | .975 | .697 | .185 | .429 |
| **Larceny** | .924 | .605 | .815 | .019 | .857 | .924 | .555 | .311 | | .143 | .983 | .160 | .034 | .101 |
| **Malicious Mischief** | .950 | .832 | .941 | .672 | .916 | .975 | .832 | .471 | .857 | | .966 | .866 | .193 | .387 |
| **Murder** | .042 | .025 | .034 | .025 | .017 | .034 | .017 | .025 | .017 | .034 | | .017 | .017 | .025 |
| **Stealing** | .924 | .622 | .899 | .202 | .849 | .958 | .571 | .303 | .840 | .134 | .983 | | .050 | .143 |
| **Truancy** | .975 | .882 | .975 | .832 | .966 | .983 | .924 | .815 | .966 | .807 | .983 | .950 | | .782 |
| **Vagrancy** | .958 | .840 | .958 | .832 | .950 | .958 | .807 | .571 | .899 | .613 | .975 | .857 | .218 | |
| $\Sigma_P$ | 10.083 | 7.192 | 8.816 | 3.825 | 8.085 | 10.319 | 7.337 | 3.625 | 6.479 | 3.142 | 12.671 | 5.522 | 1.160 | 2.564 |
| **Rank Order** | 3 | 7 | 4 | 10 | 5 | 2 | 6 | 11 | 8 | 12 | 1 | 9 | 14 | 13 |

## TABLE III

*Sigma Values Corresponding to Proportions in Table II*

| | Arson | Assault | Burglary | Drunkenness | Forgery | Highway Robbery | Immorality | Incorrigibility | Larceny | Malicious Mischief | Murder | Stealing | Truancy | Vagrancy |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Arson | | — .445 | — .615 | —1.432 | — .866 | — .010 | — .693 | —1.378 | —1.432 | —1.644 | +1.727 | —1.432 | ** | —1.727 |
| Assault | + .445 | | + .222 | — .806 | + .138 | + .722 | + .201 | — .693 | — .266 | — .962 | ** | — .310 | —1.185 | — .994 |
| Burglary | + .615 | — .222 | | —1.498 | — .470 | + .693 | — .222 | ** | — .896 | —1.563 | +1.825 | —1.275 | ** | —1.727 |
| Drunkenness | +1.432 | + .806 | +1.498 | | +1.328 | +1.727 | + .962 | — .222 | +1.231 | — .445 | ** | + .834 | — .962 | — .962 |
| Forgery | + .866 | — .138 | + .470 | —1.328 | | + .994 | — .115 | —1.032 | —1.066 | —1.378 | ** | —1.032 | —1.825 | —1.644 |
| Highway Robbery | + .010 | — .722 | — .693 | —1.727 | — .994 | | — .541 | —1.825 | —1.432 | ** | +1.825 | —1.727 | ** | —1.727 |
| Immorality | + .693 | — .201 | + .222 | — .962 | + .115 | + .541 | | — .896 | — .138 | — .962 | ** | — .178 | —1.432 | — .866 |
| Incorrigibility | +1.378 | + .693 | +1.231 | + .222 | +1.032 | +1.825 | + .896 | | + .493 | + .072 | ** | + .515 | — .896 | — .178 |
| Larceny | +1.432 | + .266 | + .896 | ** | +1.066 | +1.432 | + .138 | — .493 | | —1.066 | ** | — .994 | —1.825 | —1.275 |
| Malicious Mischief | +1.644 | + .962 | +1.563 | + .445 | +1.378 | ** | + .962 | — .072 | +1.066 | | +1.825 | +1.107 | — .866 | — .287 |
| Murder | —1.727 | ** | —1.825 | ** | ** | —1.825 | ** | ** | ** | —1.825 | | ** | ** | ** |
| Stealing | +1.432 | + .310 | +1.275 | — .834 | +1.032 | +1.727 | + .178 | — .515 | + .994 | —1.107 | ** | | —1.644 | —1.066 |
| Truancy | ** | +1.185 | ** | + .962 | +1.825 | ** | +1.432 | + .896 | +1.825 | + .866 | ** | +1.644 | | + .788 |
| Vagrancy | +1.727 | + .994 | +1.727 | +. 962 | +1.644 | +1.727 | + .866 | + .178 | +1.275 | + .286 | ** | +1.066 | — .778 | |

** Indicates proportions of less than .03 or more than .97 for which no corresponding sigma values are recorded.

Table II gives experimental proportions based on 119 judgments and should be interpreted as follows: 73.1 per cent of the judges regard *arson* as more serious than *burglary;* 61.3 per cent estimate *malicious mischief* to be more serious than *vagrancy;* and so with the remainder of the table which is interpreted in like manner. In the lowest two horizontal rows of compartments are found the summed proportions for each column and the rank order of offenses derived from these totals.

In Table III will be found sigma values corresponding to the percentages in Table II, the exception being that proportions of less than .03 and greater than .97 have been omitted (13).

The transmutation of proportions to sigma values was accomplished with the Kelley-Wood Table of the Normal Probability Integral (5).

Applying the Thurstone formula to the data of Table III the scale separations become as follows:

TABLE IV

*Scale Separations*

| | |
|---|---|
| Murder—Highway Robbery | 2.308 |
| Highway Robbery—Arson | .148 |
| Arson—Burglary | .483 |
| Burglary—Forgery | .282 |
| Forgery—Immorality | .345 |
| Immorality—Assault | .063 |
| Assault—Larceny | .196 |
| Larceny—Stealing | .375 |
| Stealing—Drunkenness | .572 |
| Drunkenness—Incorrigibility | .137 |
| Incorrigibility—Malicious Mischief | .134 |
| Malicious Mischief—Vagrancy | .241 |
| Vagrancy—Truancy | .584 |

By setting the scale value of *truancy* arbitrarily at .000 and adding the scale differences between the successive delinquent acts the scale value for each offense is as follows:

TABLE V

*Scale Values*

| | | |
|---|---|---|
| Murder | 5.818 | 68 |
| Highway Robbery | 3.510 | 45 |
| Arson | 3.362 | 44 |
| Burglary | 2.929 | 39 |
| Forgery | 2.647 | 36 |
| Immorality | 2.302 | 33 |
| Assault | 2.239 | 32 |
| Larceny | 2.043 | 30 |
| Stealing | 1.668 | 27 |
| Drunkenness | 1.096 | 21 |
| Incorrigibility | .959 | 20 |
| Malicious Mischief | .825 | 18 |
| Vagrancy | .584 | 16 |
| Truancy | .000 | 10 |

To make the scale less unwieldy and more adapted to practical purposes a constant of 1 has been added to each value and the sum multiplied by 10, thus eliminating the decimals. The converted scale values appear in the third column of Table V. It will be noted that the distribution of scale values for juvenile delinquencies conforms reasonably closely to the distribution found by Thurstone for crimes. That is, a tendency is present at the extremes of the distribution for values to be separated by rather wide intervals while at the center the values tend to cluster together closely with smaller scale intervals between the offenses.

## V. Discussion

In connection with an appreciable number of responses certain questions were raised which are significant enough in import to warrant special attention. These observations fall into three categories. First, what standard shall be adopted in judging the seriousness of a delinquent act? Second, are not the circumstances under which an act is committed the criteria of its seriousness? Third, does a scale such as the present

one take into consideration the motive for delinquencies?

Fundamentally an answer to the first of these queries rests on a clarification of the postulate upon which this experiment was conducted. First of all, any limiting or qualification of the term *serious* was avoided advisedly and deliberately. While in a quantitative continuum, in which *judgments* were the basis for determining the scale values of the various offenses, a certain consensus was to be expected, variability among the judges was assumed also. Indications of a point of view or standard would have defeated the purpose of the experiment by circumscribing individual variation of judgment.

For practically the same reasons no reference has been made to the circumstances surrounding an offense. To have defined the conditions in terms of which the gravity of a delinquent act was to have been adjudicated would have erected a barrier to the most comprehensive basis of judgment. It is true, of course, that in a narrow sense offenses are more or less serious as the conditions of commitment are one set of factors or another. A particularly revolting murder has a different effect on the social group than a homicide in which there might be found conceivably some justifiable grounds. And yet fortuity may have played a role important enough to have made one murder *seem* more serious than the other.

If circumstances are regarded as synonymous with causes of delinquency, one finds no better reason for assuming that the degree of seriousness can be measured by a knowledge of special conditions surrounding the act. The burden of evidence tends to show that causes are multiple rather than unitary. The same casual basis may lead to one of several forms of overt asociality. Therefore, to stress the causes or circumstances of one act of delinquency is dealing with pure fiction. Apart from a knowledge of the total situation it is impossible to evaluate causes or circumstances. This is well expressed by Thomas and Thomas (11): "The total situa-

tion will always contain more and less subjective factors, and behavior reaction can be studied only in connection with the whole context, *i. e.*, the situation as it exists in verifiable objective terms . . . ." And let it be emphasized now that with the present scale no pretensions are made that it will throw any light on the etiology of juvenile delinquency. Pragmatically nothing more is expected than that it will give an index of the total predisposition in terms of known asocial performance.

At this juncture it is necessary to consider briefly the relationship between motivation and juvenile delinquency. Lund (6) states that "behavior is said to be motivated when it shows fairly definite directional trends." These *directional trends* are present dynamically in juvenile delinquents in the form of acquired modes of adjustment to the demands of the environment (2). This does not indicate, however, an invariable concomitance between the mode of asocial act and inner or outer activating conditions. That is, there is no reason for supposing that an individual's conduct is predetermined toward truancy, stealing, immorality or other such offenses by a specific complex of factors. Rather the evidence available tends to show that such directional trends as operate in the case of delinquents are related to offenses in general rather than offenses particularly. The fundamental drives, hunger and sex, illustrate the point at issue. There are no means for predicting that the manifest forms of behavior will be archetypes of the tissue conditions basic to the drive. The range of sublimated and substitute forms of behavior that may result from the hunger and sex drives are exceedingly broad. It is interesting to note in this regard that stealing has been found in many cases to be motivated by the sex impulse, but this form of asociability is likewise in other cases a function of factors foreign to the sex drive. Just as was mentioned with respect to the circumstances of a delinquent act, so with motives—it appears that

juvenile delinquencies must be interpreted in the light of multi-motivation rather than assigning unit motives for specific delinquent acts.

Referring again to Lund's conception of motivation, it is obvious from the viewpoint expressed here that directional trends in the case of juvenile delinquency refer to a general predisposition, varying in degree and strength, toward asocial behavior. Since overt manifestations of this predisposition do not appear to be the keys to specific motives that are coterminous with different offenses, judgment of the seriousness of delinquent acts in terms of motives does not seem feasible. It may be assumed, however, that various delinquencies are expressions of a general directional trend, in the same way that performance in certain standard situations is an expression of intelligence or lack of it. By devising a method whereby differential scale values can be given to the different types of delinquent performance, to all intents and purposes the directional trend toward juvenile delinquency is being measured. That is, to what degree a given individual is motivated toward asociality is ascertained by evaluating the expressed forms of his predisposition.

## VI. Conclusions

From this study the following may be concluded:

1. Since on practical grounds juvenile offenses vary in seriousness, the development of a scale by means of which the degree of seriousness can be measured has been undertaken.

2. Limitations of methods by means of which the gravity of juvenile acts is estimated in terms of equal increments on a linear scale have been pointed out.

3. Using Thurstone's technique of paired comparisons and a formula devised by him for ascertaining scale separations between different offenses, a series of scale

values for fourteen forms of delinquent behavior have been obtained.

4. The distribution of scale values for delinquencies compares favorably with the distribution found by Thurstone for crime.

5. Limitations of judgments of seriousness based on circumstances or motives for offenses have been discussed critically.

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# A COMPARISON OF THE EMOTIONAL DEVELOPMENT OF INDIANS BELONGING TO DIFFERENT TRIBES

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This paper is one of a series reporting use of the Interest-Attitude Tests[1] (a revision of the writers' X-O Examination) with Indian and rural white children. The other papers discuss the construction of these tests and their use to establish norms for white children, the development of attitudes among breeds as compared to full-blooded Indians, of white and Indian children in the sixth through the twelfth grade. In the course of collecting the data[2] a number of Indian schools were tested in various parts of the country.[3] The pupils came from over thirty different tribes, the number per tribe ranging from 216 for the Sioux to one lone Seneca. The actual distribution of cases is given below. The tribes have been grouped according to such a general division of Indian tribes as is used by anthropologists.[4]

[1] For an account of the development of these materials see an article by Pressey, S. L. and L. C., "The Interest-Attitude Tests," *Journal of Applied Psychology*, Vol. XVII, No. 1, p. 1.

[2] This work was done under grant from the National Research Council.

[3] In Nebraska, Montana, California, New Mexico, and Oklahoma.

[4] In the list below certain tribes from whom only one or two cases were obtained have been combined with others of like character—in interests of shortening the lists. Where this has been done the names of such tribes appear in parenthesis after the one with which they have been combined.

TABLE I

*Showing the Number of Indians Tested in Each Tribe*

| | | | Total |
|---|---|---|---|
| Group I: | Pueblo Indians | | |
| | Zuni | 142 | |
| | Hopi | 119 | |
| | Laguna | 1 | |
| | Pueblo | 29 | |
| | | | 291 |
| Group II: | Nomadic Plains Indians | | |
| | Sioux | 216 | |
| | Arapaho | 52 | |
| | Cheyenne | 43 | |
| | Crow | 126 | |
| | Assiniboine | 2 | |
| | | | 439 |
| Group III: | Semi-Sedentary Plains and Eastern Woodland Indians | | |
| | Pottowatomie (Sac and Fox) | 47 | |
| | Winnebago | 84 | |
| | Omaha (Iowa, Ponca, Otoe) | 64 | |
| | Cherokee | 122 | |
| | Creek | 20 | |
| | Choctaw | 7 | |
| | Chickasaw | 3 | |
| | | | 347 |
| Group IV: | Southwestern, non-Pueblo Indians | | |
| | Navajo | 193 | |
| | Apache | 6 | |
| | Pima | 26 | |
| | Papago | 25 | |
| | Yuma | 22 | |
| | Walapai | 8 | |
| | Hanasupai | 4 | |
| | Mohave | 19 | |
| | Maricopa (Cocopa) | 5 | |
| | | | 308 |

| | | | |
|---|---|---|---|
| Group V: | Basin Indians | | |
| | Ute | 86 | |
| | Painte | 54 | |
| | Shoshone | 29 | |
| | Comanche | 6 | |
| | Chemehuevi | 5 | |
| | | | 180 |
| Group VI: | California Indians | | |
| | Mission | 147 | |
| | Digger (Concaw) | 24 | |
| | Chuckchausi (Tache, Tule River) | 17 | |
| | Hupa (Laytonville, Wailaki, Smith River) | 26 | |
| | Wintun (Nomlaki) | 23 | |
| | Pomo (Little Lake) | 20 | |
| | Pit River (Hat Creek) | 19 | |
| | Klamath (Modoc) | 46 | |
| | Washoe | 3 | |
| | Karok | 9 | |
| | Miwok | 21 | |
| | Mono | 11 | |
| | | | 366 |

The total number of Indians tested was 1,931, whose chronological ages were from 9 to 23.

It will be noted that for only eight tribes were there more than 100 cases tested: the Zuni, Hopi, Sioux, Crow, Navajo, Cherokee, Ute, and Mission. To this list was added the Winnebago (84 cases) since it was desired to include one more tribe from this general group if possible. For these nine tribes results have been presented separately.

The tests used permitted of the expressing of results in terms of "emotional age."[5] This reading of raw scores into emotional ages does not, however, affect the interrelations of the scores with each other in the least. Slightly different norms are used for the boys and girls in de-

[5] If the reader is interested in the exact technique used he is referred to the article describing the Interest-Attitude Tests.

termining these ages, but once the emotional age has been found from use of the appropriate norms there seems no good reason why a single tabulation of these ages for both sexes will not suffice for the problem in hand.

The technique for comparing the nine separate tribes has been (a) to tabulate in adjoining columns the chronological ages and the emotional ages of those tested. From these two distributions (b) the median chronological and median emotional ages may be determined. Finally a subtraction of the latter median from the former will show (c) the median years of emotional retardation. The results of this technique are shown in Table II.

The wide variation in the median emotional retardation—from 3.6 to 1.2 years—presumably must have significance. It clearly does not reflect differences of cultural level within the tribes themselves, since those acquainted with the situation would agree that the Hopi and Zuni had the highest culture and the Utes the lowest, with the other tribes coming in between in some such order as the Navajo, Zuni, Cherokee, Sioux, Winnebago, and Crow. It is suggested that the test scores may reflect the degree to which a group of Indians has been exposed to the white man's ideals, manners, customs, attitudes, and so on. There is this much evidence in favor of this assumption: The Hopi, Navajos, and Utes have a close tribal unity within themselves, practice their own customs and ceremonies, live in considerable isolation from white people, do not interbreed with whites, and generally have managed to preserve to a remarkable extent their tribal integrity in the face of a nearby white civilization. At the other end of the scale, the Crow and Mission Indians have long been subject to white culture. There are many whites living on both reservations; the Indian and white children go to the same public schools. There has been considerable interbreeding. These Indians are constantly in touch with the white man and

TABLE II

*Showing the Distribution of Chronological and Emotional Ages for Nine Indian Tribes*

| Age | Hopi | | Navajo | | Ute | | Sioux | | Winnebago | | Zuni | | Cherokee | | Mission | | Crow | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | E | C | E | C | E | C | E | C | E | C | E | C | E | C | E | C | E |
| 8 | | 2 | | 3 | | 3 | | 2 | | 3 | | 2 | | | | | | 3 |
| 9 | | 11 | | 7 | | 8 | | 14 | | 7 | 1 | 10 | | | | 9 | | 2 |
| 10 | 2 | 18 | 1 | 22 | 1 | 15 | 1 | 18 | 1 | 12 | 1 | 14 | | 3 | 1 | 19 | | 8 |
| 11 | 6 | 16 | 2 | 33 | 1 | 14 | 1 | 16 | 3 | 17 | 7 | 24 | | 6 | 10 | 17 | 6 | 5 |
| 12 | 10 | 20 | 9 | 38 | 9 | 20 | 10 | 23 | 12 | 11 | 21 | 32 | 1 | 4 | 13 | 14 | 6 | 11 |
| 13 | 11 | 17 | 13 | 27 | 15 | 23 | 10 | 17 | 17 | 9 | 28 | 19 | 5 | 10 | 22 | 25 | 13 | 13 |
| 14 | 12 | 14 | 32 | 35 | 13 | 29 | 21 | 45 | 15 | 9 | 25 | 15 | 13 | 24 | 24 | 24 | 18 | 30 |
| 15 | 13 | 7 | 29 | 18 | 18 | 13 | 22 | 24 | 14 | 6 | 18 | 18 | 9 | 21 | 20 | 18 | 22 | 18 |
| 16 | 20 | 6 | 32 | 5 | 26 | 7 | 43 | 19 | 5 | 5 | 20 | 5 | 19 | 23 | 23 | 6 | 17 | 9 |
| 17 | 15 | 5 | 30 | 5 | 23 | 7 | 34 | 18 | 7 | 3 | 13 | 2 | 29 | 19 | 14 | 9 | 17 | 16 |
| 18 | 16 | 3 | 22 | | 18 | 2 | 36 | 8 | 5 | 1 | 6 | | 25 | 10 | 13 | 5 | 14 | 6 |
| 19 | 11 | | 13 | | 10 | | 20 | 9 | 3 | | 1 | 1 | 12 | 2 | 2 | 1 | 12 | 5 |
| 20+ | 3 | | 10 | | 6 | | 18 | 2 | 2 | 1 | 1 | | 9 | | 5 | | 1 | |
| Total | 119 | 119 | 193 | 193 | 140 | 140 | 216 | 216 | 84 | 84 | 142 | 142 | 122 | 122 | 147 | 147 | 126 | 126 |
| Median Chronological Age | 16.2 | | 16.3 | | 16.5 | | 17.0 | | 14.6 | | 14.5 | | 17.5 | | 15.2 | | 15.9 | |
| Median Emotional Age | | 12.6 | | 12.8 | | 13.5 | | 14.4 | | 12.3 | | 12.6 | | 15.7 | | 13.6 | | 14.7 |
| Difference | 3.6 | | 3.5 | | 3.0 | | 2.6 | | 2.3 | | 1.9 | | 1.8 | | 1.6 | | 1.2 | |

his ways—and have to some extent observably taken over the white man's attitudes. It may be, then, that the test reflects primarily the degree of "sophistication" shown by each group of Indians in respect to white customs, interests, ideals, and attitudes. Such an assumption would appear plausible. In view of what is known concerning the development of attitudes generally it seems hardly likely that different ancestral stock could account for these differences; there is every evidence that attitudes are made by experience rather than by inheritance. If, then, one is limited to explanations based on environment one might find the above discussion acceptable.

Some further study was made into the degree of emotional retardation for each large classification of tribes. These classifications are partly geographical and partly cultural, the tribes in each group belonging to more than one linguistic stock. These large units may be of too diverse character for serious consideration; since, however, both the tests used and the classification seem to reflect certain general factors it would seem advisable

TABLE III

*Showing the Median Chronological Age, the Median Emotional Age, and the Years of Emotional Retardation for the Indians in Each of Six General Groups*

| No. Cases | Groups[6] | Median Chronological Age | Median Emotional Age | Years of Emotional Retardation |
|---|---|---|---|---|
| 366 | California Tribes | 15.7 | 13.7 | 2.0 |
| 439 | Nomadic Plains Tribes | 16.4 | 14.3 | 2.1 |
| 347 | Semi-Sedentary Plains and Eastern Woodland Tribes | 16.4 | 14.3 | 2.1 |
| 291 | Pueblo Tribes | 15.3 | 12.7 | 2.6 |
| 180 | Basin Tribes | 16.6 | 13.7 | 2.9 |
| 308 | Southwestern Non-Pueblo Tribes | 16.5 | 13.0 | 3.5 |

[6] For the tribes included in each group the reader is referred to Table I.

to present the results for what they may be worth. The tabulations were made for chronological and emotional ages and the medians of both distributions found in identically the same manner already displayed for the nine separate tribes.

In considering these results the same conclusion as earlier presented is forced upon the writers—that the tests are not measuring the Indian's own culture but his degree of contact with the white man's culture. The Southwest Non-Pueblo Tribes are isolated geographically by hundreds of miles of desert (as are also the Basin Indians) and are not sufficiently picturesque to attract that carrier of "white" customs and demander of "white" conveniences, behavior, standards—the Great American Tourist. It should also be noted that the tribes showing the least emotional retardation live in territory conquered both early and intensively by the whites.

It is clear that this grouping of tribes operated to cover up certain of the extreme differences, which vary from a median emotional retardation of 5 years for the 19 Mohaves and 4 years for the 22 Yumas to 1.5 for the 20 Pomo and 1.2 for the 126 Crow. It would be desirable at some later time to obtain results from a larger number of these extreme tribes and then make a careful comparison of the results, not only as to total score but item by item. It is the opinion of the writers that only by such detailed study of extreme groups can one approach the real causes of differences in emotional attitudes. It is hoped that such work may be done in the future.

# A FURTHER STUDY OF THE TURNOVER OF PSYCHOLOGISTS

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In 1925 the writer published a report on the changes in position—resignations and promotions—made by members of the American Psychological Association, during the period 1920-1925 (14). The investigation has been continued to date and will be reported below.

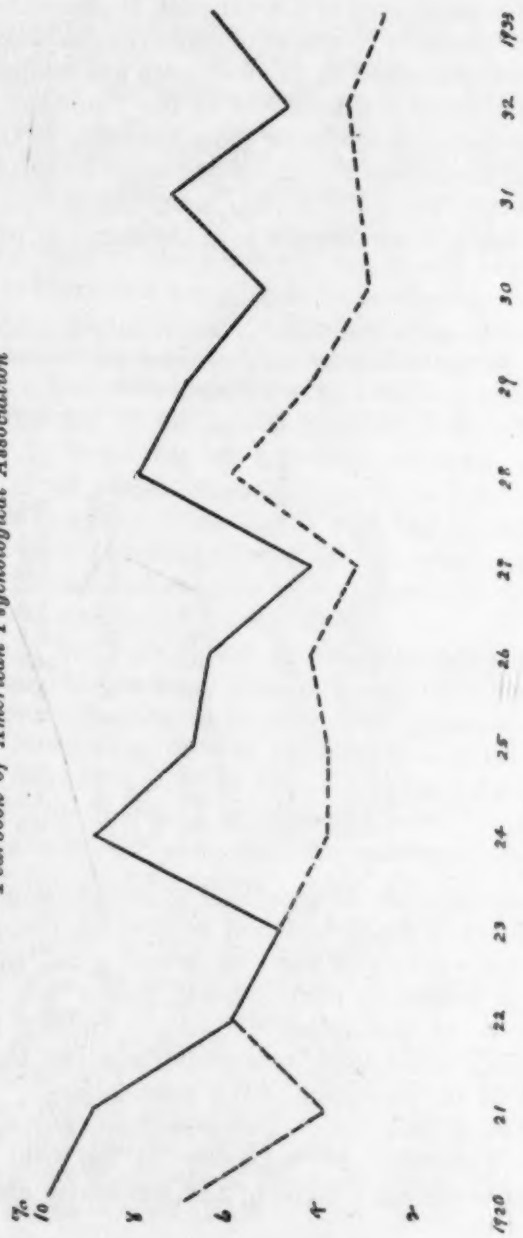
As in the previous inquiry these data were taken from the yearbooks of the Association, the names appearing in each book being compared with those appearing in the preceding yearbook. The number of persons who died or had resigned from the Association during the year was subtracted from the roster, and the number remaining furnished the basis for computing the percentages of resignations and promotions during that year. Results are shown in Table I.

In order to have a complete picture covering the fourteen years investigated the curve of the first five-year period is reproduced together with that of the latter period. (Figure I.) Here we see that the relative number of resignations is always larger than the number of promotions except in the years 1922 and 1923. The resignations reached a high peak of 10 per cent in 1920 following the unsettled conditions incident to the World War and with some fluctuations have gradually decreased in number.

The relative number of promotions has been small. From a high point of 7 per cent in 1920, the number has dropped, except for a rise in the prosperous year of 1928

FIGURE 1

*Resignations——— and Promotions- - - - - Among Persons Listed in Yearbook of American Psychological Association*



to the present level of 2.8 per cent. It should be remarked that promotions in non-academic organizations, where an increasing number of psychologists are finding positions, are not easily distinguished in the Yearbook.

One factor that affects these statistics is the large influx of Associates into the Association since 1926. Objection might be made to their inclusion in this study, but since our present interest is in the status of psychologists

TABLE I

*Persons Listed in Yearbooks of American Psychological Association, with Number Who Resigned and Number Who Received Promotion*

| Yearbook | Number Listed | (Subtract) | Net | Number Who Resigned | Per Cent Resigned | Number Promoted | Per Cent Promoted |
|---|---|---|---|---|---|---|---|
| 1925 | 471 | 5 | 466 | 33 | 7.0 | 19 | 4.0 |
| 1926 | 535 | 5 | 530 | 35 | 6.6 | 23 | 4.3 |
| 1927 | 608 | 26 | 582 | 25 | 4.3 | 20 | 3.4 |
| 1928 | 699 | 8 | 691 | 56 | 8.1 | 43 | 6.2 |
| 1929 | 893 | 25 | 868 | 53 | 6.1 | 37 | 4.3 |
| 1930 | 1113 | 17 | 1096 | 61 | 5.5 | 40 | 3.2 |
| 1931 | 1269 | 26 | 1243 | 94 | 7.5 | 43 | 3.4 |
| 1932 | 1510 | 24 | 1486 | 75 | 5.0 | 56 | 3.7 |
| 1933 | 1696 | 25 | 1671 | 111 | 6.6 | 47 | 2.8 |

in general, it would seem fair to include them. Election to Associate grade is based in part on the qualification that the candidates must be devoting full time to work that is primarily psychological, hence they must share the fate of the active members. Indeed, numerically speaking, Associates now constitute the bulk (60 per cent) of the personnel of the Association.

There is no question, however, that the presence of so great a number of beginners in the field affects the turnover figures. Some of the Associates are still grad-

uate students and have no recognized position except that of Scholar or Fellow. In cases where this post was obviously only a step in the prosecution of a higher degree, no change in status was tabulated.

Another source of difficulty in accurately tabulating the changes of the past few years is the number of persons working under fellowships of the National Research Council. In view of the avowedly temporary nature of these grants there is a question as to whether or not the relinquishment of one should be considered as a resignation. In case the incumbent left a position only to work on a National Research Council project for a year or two and then returned to his former position (this could be ascertained by referring to previous yearbooks), the changes were not tabulated as turnovers. In case the incumbent was a young psychologist who had already received the doctor's degree and had held no other position, however, a relinquishment of National Research Council fellowship was counted as a resignation.

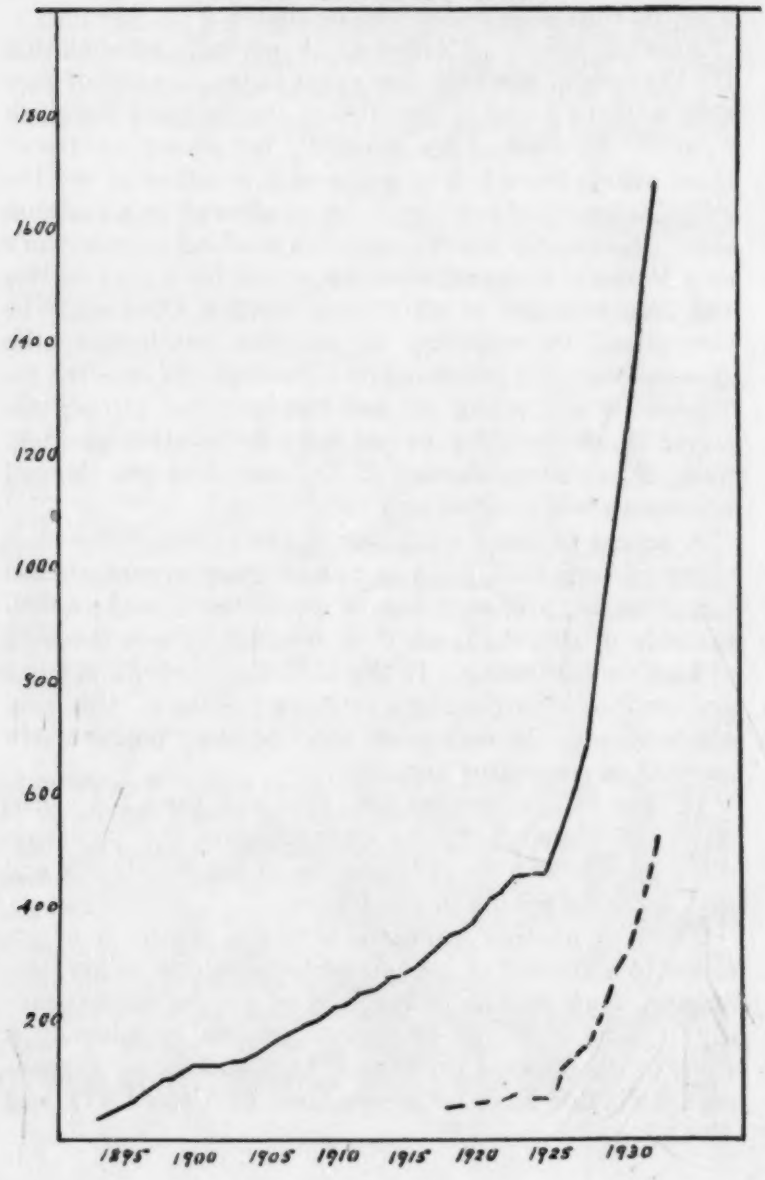
A source of some confusion is the circumstance that many persons hold posts in two or more organizations; for example, professorship in a university and consultantship in an outside clinic or hospital, or a lectureship at another institution. In the 1933 Yearbook 82 persons are credited with holding 2 or more positions. One person holds six. In such cases only the main position was counted in computing turnover.

In view of the complications that now beset the calculation of turnover among psychologists the writer is doubtful whether the examination of the yearbooks will give accurate results in the future.

There is another question, however, which is of interest to a student of the personnel problems of psychologists: How rapidly is the field of psychology expanding? Some light can be thrown on this question by a study of the curve of growth of the Association. Figures regarding this have been published by Cattell (7) and

FIGURE 2

*Total Number of Persons Listed in Yearbooks of American Psychological Association. Dotted Line Represents Number of Women, 1918-1933*



Fernberger (12). A curve based on the data furnished by these investigators supplemented by figures drawn from the latest yearbooks appears in Figure 2. This shows a remarkable growth. From the small group of 31 men, so heterogeneous that "it is doubtful if more than twenty . . . . could today be elected to full membership in the association" (12), the Association has grown in 40 years to almost 1,700. The greatest expansion has occurred during the past ten years. In the decade 1920-30 the number increased from 393 to 1,113—practically 300 per cent. During this period the number of dentists in the United States increased only 26 per cent. Fernberger wrote in 1928, "In 1920 there were only 3.5 professional psychologists per 1,000,000 population and in 1928 this has been increased to 5.9 per cent" (11).

Since the curve is so steep we may assume that the number of psychologists will continue to grow. Whether or not they can be absorbed by society is, of course, a matter concerning which no data are available. It is certain that there are a number of psychologists who are unemployed and others who are engaged in non-psychological work. It is possible that this condition might be alleviated somewhat if some of the subordinate positions now held by psychologists who have more than one position were of such nature that they could be distributed among the unemployed. It should be remarked in this connection, however, that some of these extra posts are probably only nominal, involving slight remuneration. Some individuals also have retired from active service and retain only honorary titles; some of the married women may hold only nominal appointments.

The status of women in the field of psychology is especially interesting. As shown in Figure 2 the number has risen from 53 in 1918 to 535 in 1933. Women now constitute 32 per cent of the persons affiliated with the Association.

These figures show that in general the fate of psychologists follows economic fluctuations; in particular does the number of promotions reflect the ebb and flow of prosperity. In addition to their interest for psychologists, such data give some basis on which to inform prospective psychologists regarding vocational opportunities in the field. In view of the large number of inquiries on this point that come to the writer it would seem desirable to have all of the references bearing on this question published in one place. Accordingly a bibliography has been appended.

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# MUSCULAR PERCEPTIVITY AS A TRADE TEST

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Hollingworth has enumerated the methods of trade testing as follows: (1) The miniature, or reproduction on a small scale of the whole or most important part of the working apparatus. (2) Assignment to the actual work for trial and (3) the analogical, or testing of the subjects' responses to a similar but simplified situation of different material. (4) The empirical method where out of a series of random and *a priori* tests a team is finally discovered which shows no inter-dependence, each individual test and the whole correlating with the criterion.

The empirical method although much emphasized recently necessitates an amount of time and money for research and test equipment which makes it almost prohibitive, except under ideal conditions. An illustration of this is furnished in the Minnesota Ability Tests, where even this group of workers was forced to modify, cut down and partially transform the pure empirical method by limiting their investigations to the more successful mechanical tests already known.

The unlimited labor and facility requirements of the empirical method suggest that in the future vocational investigators may well turn from a too free range of haphazard and random selections of try-out tests to investigations limited by a definite hypothesis. Psychologists will do well to make assumptions of some kind as a basis of their investigations, even as do biologists and chemists, and work empirically within the limits of this field.

The writers of this report have made such an hypothesis as follows: We assume that muscular perceptivity is involved in all muscular work and that therefore tests of muscular perceptivity, which may be modeled on the analogical method, should indicate in some degree, fitness for occupations requiring muscular skill.

The experiments we are describing below all bear on this assumption. They have been carried on at one time or another as opportunity offered by Dr. Weinland or by students under his direction. The method varies somewhat with the different investigations, but underlying them all is the hypothesis that muscular perceptivity might well prove a good test for muscular skill.

Experiment No. 1—January, 1925.

| | | | |
|---|---|---|---|
| Subjects— | Class No. 1 | Athletes in training | 14 |
| | Class No. 2 | Athletes not in training | 21 |
| | Class No. 3 | Non-athletes, men who had not taken part in college athletics | 28 |

Investigators: Messrs. Laramy and Lehule of Lehigh University.

The sixty-three subjects used in this experiment came from two groups, the greater number of them from Psychology classes at Lehigh University. Others were taken from the squad of the football team which was in training at that time. The method of the investigators was to have each subject rest his foot on the base of a back and leg dynomometer, grasping the handle, adjusted to his height, with both hands. He was to pull upward slowly until the experimenter told him that the 50 Kilogram mark had been reached, at the same time gauging the force exerted in a 50 Kilogram pull. He was then given three trials to attempt to exert an equal pull without looking at the indicator. For purpose of scoring and comparing results the off scores were found. This is the difference, either below or above, between the trial pull and the 50 mark. For instance if one subject's tries were 50, 50, 50 the off score in each case would be 0 and

the total off score 0. If 50, 45, 55 the off scores would be 0, 5, 5 and the total 10. It was the total that was used in the comparison. The frequencies for the off scores of the three classes were as follows:—

| Off Score | Class 1 | Class 2 | Class 3 |
|---|---|---|---|
| 0 | 5 | 0 | 0 |
| 5 | 3 | 3 | 1 |
| 10 | 2 | 5 | 7 |
| 15 | 0 | 5 | 4 |
| 20 | 4 | 2 | 1 |
| 25 | 0 | 0 | 0 |
| 30 | 0 | 0 | 1 |
| 35 | 0 | 3 | 2 |
| 40 | 0 | 1 | 2 |
| 45 | 0 | 0 | 2 |
| 50 | 0 | 0 | 3 |
| 55 | 0 | 0 | 0 |
| 60 | 0 | 0 | 2 |
| 65 | 0 | 1 | 1 |
| 70 | 0 | 0 | 1 |
| 75 | 0 | 0 | 0 |
| 80 | 0 | 0 | 0 |
| 85 | 0 | 0 | 1 |
| 90 | 0 | 0 | 0 |
| 95 | 0 | 1 | 0 |
| Totals | 14 | 21 | 28 |

The averages for the three groups were 8.02 for the athletes in training, 23.09 for the athletes out of training and 32.67 for the class No. 3—non-athletes.

Experiment No. 2. Investigator—Ralph Kreiss, New York University.

Subjects—Class No. 1 15 Athletes in Training
Class No. 2 15 Athletes out of Training
Class No. 3 15 Non-Athletes

A Kny-Scheerer hand dynomometer was used. It registers in Kilos. The subject took it in either hand and squeezed until it registered 45 Kilos. After attempting to fix the necessary muscular exertion for this feat he

then tried three times to duplicate it while looking away. The off score this time was the difference between the average of these tries and the ideal 45. They are as follows:

| Athletes in Training | | Athletes Out of Training | | Non-Athletes | |
|---|---|---|---|---|---|
| Class No. 1 | | Class No. 2 | | Class No. 3 | |
| Off Score | F | Off Score | F | Off Score | F |
| 1 | 3 | 0 | 1 | 2 | 2 |
| 2 | 1 | 1 | 1 | 4 | 1 |
| 4 | 4 | 3 | 3 | 6 | 1 |
| 5 | 1 | 4 | 1 | 9 | 1 |
| 6 | 2 | 7 | 1 | 10 | 1 |
| 9 | 1 | 11 | 2 | 11 | 1 |
| 10 | 1 | 12 | 1 | 12 | 4 |
| 16 | 1 | 13 | 1 | 13 | 2 |
| 25 | 1 | 14 | 1 | 16 | 1 |
| | 15 | | 15 | | 15 |

The computed means are 6.53, 8.27 and 9.47 respectively.

Experiment No. 3. Investigator—Anthony Fiore.

Class No. 1, 37 men and women engaged in work which required use of the hands.

Class No. 2, 28 Students.

Class No. 1 was represented mostly by workers in dress factories. Included also were three house workers, two shipping clerks, one jeweler, one electrician, two painters, a carpenter and a house wife. An ordinary kitchen scale of the flat top variety was used and the subject, watching the indicator, was asked to press down with a force necessary to attain ten pounds, three times, on each occasion paying particular attention to the amount of force expended. The face of the scales was then turned away from him and he was asked to duplicate the feat three times. Then the other arm, and legs were tested. Off scores as in experiment No. 1 were used. The averages of the off scores are as follows:

| | Right Hand | Left Hand | Right Foot | Left Foot |
|---|---|---|---|---|
| Non-Manual, Class No. 2 | 5.30 | 3.34 | 5.95 | 4.95 |
| Manual, Class No. 1 | 4.41 | 3.82 | 6.32 | 6.34 |

What is marked here is the superiority of the occupational class to the students in the right hand and the superiority of the students with their feet.

The apparent explanation is that because of general athletics and some bodily exercise, which no student could very well avoid, and also perhaps because of a slight advantage in age, the non-manual class excelled with their feet and left hands, while the occupational group excelled with their right hands. Dress operators, cutters, seamstresses, painters, etc., use their feet for little but walking but are apt to develop considerable skill with their much used right hands.

Another point which may be noted is the somewhat better scoring of the left side of the body. This finding is not supported by other experiments and was probably due to the procedure. In this experiment the right hand was always tested first.

Since the majority of men to women in the student class made it impossible to attempt to determine in that group the sexual factor in muscular perceptivity, only the occupational class was analyzed in this matter. Here there were 20 men and 17 women. The averages were:

| | Right Hand | Left Hand | Right Foot | Left Foot |
|---|---|---|---|---|
| 20 Men | 4.09 | 3.45 | 6.20 | 4.80 |
| 17 Women | 4.76 | 4.26 | 7.00 | 7.50 |

These results suggest superiority for men in muscular perceptivity but whether the superiority is native or whether due to difference in occupation, exercise after work, fiddling with tools and the countless other things that men do more than women, can not be said.

Experiment No. 4

This was the first experiment made, but as it most nearly approximates trade conditions, it is given last.

The subjects were students in the School of Household Sciences and Arts of Pratt Institute. The School of Household Sciences and Arts trains women for various occupations including trade sewing, millinery (at the time of investigation) and dress design. An attempt is made to have the training resemble as closely as possible trade conditions.

As criterion the estimates of the teachers who have all had trade experience were taken. On examination of actual work performed they graded the student as A, B, and C, taking into consideration the individual's grade advancement. These grades were then changed into quantitative form by the investigator substituting for them numbers 9, 8, and 7, etc., and averaging them.

On the basis of observation of the students at work and discrete** discussion with them and the teachers, it was decided that muscular perceptivity, motor coordination and speed were important factors in this work.

Two tests were prepared with the purpose of testing these traits in one single experiment. The first was called the Maze Test which required primarily speed. Little muscular perceptivity or motor control was involved. It had such low results that it was subsequently abandoned. With 56 cases the $r$ with the criterion was only $.19 \pm .09$. A description of it need not be gone into. The more successful one, the Thread Test, was the one finally used.

It consists of an inch thick board, one foot square. Back from one corner are two spindles for spools of thread. At right angles from this corner and closer to it are two channels one-half inch deep with a right angled bend and small culde-sac at the end of each. In these channels are sunk three screws to a level even with the top sides of the channel and one at the right angled bend. The work is to wind the thread around the screws, both hands working at once and going in different directions. More than simple muscular perceptivity is required to do this well; motor coordination and speed being also factors.

** Experience has disclosed that in any discussion with a worker as to his symptoms or necessary qualities for the work, any careless or tactless questions will lead to erroneous answers because of mistrust.

The subject is shown how to do the work and is carefully instructed for two minutes. All mistakes are pointed out, such as winding the thread the wrong way at far ends, but no advantageous methods are suggested. After a two minute practice the thread is all wound back and the subject is told to "do the same thing and do it as quickly as you can."

A five minute work period is allowed and the number of turns taken with the thread are counted. This count is the score.

As this test was considered most analogous to trade sewing, the results for a number of trade sewing students are given separately. The figures follow:

With the 24 students of the trade sewing class, the results were:

| | Thread Score | School Grade |
|---|---|---|
| Av. | 63.38 | 6.34 |
| S.D. | 16.25 | 1.59 |
| V. | .26 | .25 |

The $r$ was .68 and its P.E.$\pm$.08.

With 92 students including other classes the $r$ was still significant, being .40 and its P.E.$\pm$.06. The other comparisons for this group were:

| | Thread Score | School Grade |
|---|---|---|
| Av. | 55.31 | 6.84 |
| S.D. | 16.65 | 1.44 |
| V. | .30 | .21 |

A comparison was made with the Otis Intelligence Test of 66 cases including trade sewing and other classes. The results were:

| | Thread | Otis |
|---|---|---|
| Av. | 52.83 | 39.12 |
| S.D. | 20.60 | 11.55 |
| V. | .39 | .30 |

$r$ equals .19$\pm$.08.

The results of these tests definitely and significantly support the thesis that muscular perceptivity is an element in skilled hand work that can be measured.

The experimenter had the belief when this particular work was done that complexity improved such a test. As noted above muscular coordination and speed as well as muscular perceptivity played a part in the thread test. It also proves a better indicator than the simple scales tests discussed in the earlier part of this article. But whether this sort of complexity is necessary or desirable has not been fully determined. The experimenters have recently developed a muscular perceptivity scales test which is much more accurate than those described, and are now collecting norms and testing trade students. This work will be reported later.

A by-product of the thread test experiment is worth noting. In spite of the good results obtained by the thread test and the demonstration of this by correlations, the teachers who might be compared with trade foremen had little use for it because it "looked so queer." Not understanding statistical treatment of results the teachers much preferred the old type "trail method" of test to this one by the method of analogy. This suggests that trade tests of this type will have to be "sold" to the trade on the basis of the results obtained rather than upon their appearance. Perhaps, in fact, they will receive a quicker reception if they are kept in the laboratory testing room and only the results made known.

The authors conclude that their assumption is established sufficiently to serve as a sound working hypothesis for other investigators as well as for further testing on their own part. If muscular perceptivity is involved in skilled muscular work and can be tested, as our results indicate, it should be possible to devise and try out trade tests on a much more economical basis than is required by the unguided empirical method.

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# WHAT THE BERNREUTER PERSONALITY INVENTORY DOES NOT MEASURE

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In the Manual for The Personality Inventory (1) Bernreuter, presenting coefficients of correlation to substantiate the validity of the Inventory, states that the reported correlations "indicate that the four traits measured by The Personality Inventory are identical with four traits which have been measured by previously validated tests."

While there are those who would raise some question as to whether test use and clinical experience have entirely substantiated this validation, there are others investigating the Inventory who seek to find out just what it does measure.

Bernreuter used the four tests—the Thurstone Neurotic Inventory, the Bernreuter Self-sufficiency Test, the Laird C2 Introversion Test, and the Allport Ascendance-Submission Reaction Study—to "locate individuals who possessed the various traits (Neurotic tendency, Self-sufficiency, Introversion-extroversion, and Dominance-submission) to an extreme degree" and established "the weights on the scoring keys . . . . on the basis of extent to which each question differentiated between the criterion group composed of these extreme individuals." In light of this procedure the validation of the Bernreuter Inventory rests not only upon its own diagnostic proficiency but also upon the predictability of the former tests upon the basis of which it is constructed and of which it is so largely a reproduction.

In the meantime the question of what the Inventory

does not measure is of equal importance. The collection of a large variety of specific mental ability and functional test results in a group of 165 college men in the first year course at the University of Pennsylvania during 1929-30 gives us a rather wide range of results in answer to this question. To be certain that our results are not entirely contradictory to the work of Bernreuter we have compared the Coefficients of Inter-correlations reported in his Manual (1) with those secured in this study.

COEFFICIENTS OF INTER-CORRELATIONS

| | By Bernreuter | | Pennsylvania |
|---|---|---|---|
| | Fall Semester | Winter Semester | 1929-30 |
| | N-70 | N-128 | N-165 |
| B1-N and B2-S | —.39 | —.39 | —.39 |
| B1-N and B3-I | +.95 | +.93 | +.88 |
| B1-N and B4-D | —.87 | —.82 | —.76 |
| B2-S and B3-I | —.28 | —.28 | —.10 |
| B2-S and B4-D | +.55 | +.50 | +.41 |
| B3-I and B4-D | —.75 | —.73 | —.41 |

While substantiating the trends reported, and almost in the same proportions, it is suggested that Bernreuter has probably laid too much emphasis on his recommendation that one need not make use of the introversion-extroversion rating, since the inter-correlations of this trait seem to show the most insistent and challenging differences. For this reason I have included all four ratings in the present study.

The other tests used in the study have all been reported at some length in the literature. The Scholastic Aptitude Test rating was secured upon the admission of the students to the College and was the test in use during 1928 and 1929. This test is reported in detail in the Annual Reports of the College Entrance Examination Board. It is representative of the verbal form of scholastic aptitude testing at the college-adult level. The Fundamental Abilities rating and the Complex Mental Processes rating

## COEFFICIENTS OF CORRELATION

| Bernreuter Personality Inventory Rating with: | *N | Bernreuter Neurotic Tendency r | Bernreuter Neurotic Tendency P.E. | Bernreuter Introvert-Extrovert r | Bernreuter Introvert-Extrovert P.E. | Bernreuter Self-Sufficiency r | Bernreuter Self-Sufficiency P.E. | Bernreuter Dominance-Submission r | Bernreuter Dominance-Submission P.E. |
|---|---|---|---|---|---|---|---|---|---|
| Scholastic Aptitude Test (Verbal) | 129 | +.29 | ±.054 | +.07 | ±.088 | +.05 | ±.084 | —.16 | ±.057 |
| Fundamental Abilities Average (Index) | 158 | +.14 | ±.079 | +.02 | ±.079 | +.32 | ±.046 | +.09 | ±.052 |
| Complex Mental Processes Average (Index) | 158 | +.08 | ±.079 | +.38 | ±.068 | +.19 | ±.077 | —.02 | ±.052 |
| Roback Judgment Test | 154 | +.17 | ±.078 | +.19 | ±.085 | —.16 | ±.052 | +.19 | ±.052 |
| Roback Opposites Test | 150 | +.35 | ±.071 | +.29 | ±.074 | +.51 | ±.060 | +.08 | ±.081 |
| Roback Application Test | 146 | +.15 | ±.081 | +.22 | ±.079 | —.11 | ±.082 | +.10 | ±.082 |
| Healy-Bronner Learning Z Test | 159 | +.29 | ±.072 | —.03 | ±.079 | +.04 | ±.079 | +.06 | ±.079 |
| Shimberg-Brotemarkle Information Test | 147 | +.23 | ±.052 | +.37 | ±.047 | +.06 | ±.055 | —.11 | ±.055 |
| First Trial Healy Motor Tapping Test | 153 | —.17 | ±.078 | —.18 | ±.078 | +.08 | ±.078 | +.04 | ±.081 |
| Second Trial Healy Motor Tapping Test | 153 | —.11 | ±.080 | —.19 | ±.078 | +.18 | ±.078 | +.12 | ±.080 |
| Brotemarkle Comparison Test | 160 | +.08 | ±.078 | +.17 | ±.076 | +.06 | ±.078 | +.03 | ±.078 |

* N varies slightly due to absence from class on date of certain tests.

are average percentile ratings based on six tests in each field. These tests have been reported in various studies by Brotemarkle (3) (4), and also discussed by Wright (5). The tests used for obtaining these ratings, as well as the other tests employed, are analyzed in some detail especially by Brotemarkle (3) and specific references are also given to former reports in the literature.

These results need no discussion as to the evidence of no significance of relationships. Since these correlations are based upon the entire distribution of the ratings, and Bernreuter has definitely stressed the diagnostic significance of the ratings at the extremes of the measures, we have further analyzed the results of the individuals who fall in the upper and lower deciles of the Bernreuter trait ratings. It is scarcely necessary to present the entire table of results attained. The above correlations tell the result rather conclusively since the dispersions in no instance of either of the four traits vary greatly from that indicated for the total spread of results.

Nor is it necessary to raise the question of the entirely satisfactory validation of the several tests employed in this study. Regardless of one's position in this matter we can be certain that the Bernreuter Inventory is not measuring the capacities measured by any of them, regardless of what they, or it, may finally be measuring.

If we accept the tentative validation of all of these measures, we can conclude that among college students the Bernreuter Personality Inventory in its four traits in no instance is measuring "scholastic aptitude," "fundamental mental abilities," "complex mental processes," "judgment," "verbal discrimination," "common sense," "visual concrete learning capacity," "general informational content," "motor control and coordination," or "the ideational content of moral concepts in emotional response."

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# THE SELECTION OF STUDENT NURSES

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This study was made at Grasslands Hospital of Westchester County, New York. Since 1927 the hospital has conducted a training school for nurses. Beginning in 1930 each entering student was given an individual psychological examination. The purposes of this paper are to report the findings of these examinations and to discuss the possible values of them.

Psychometric results are available in 82 cases. Grouped by classes (identified by entering dates) these findings are as follows:

| Class | Number | Mean C.A. | Mean IQ | Median IQ |
|---|---|---|---|---|
| Fall 1930 | 8 | 19 | 118 | 119 |
| Spring 1931 | 8 | 19 | 112 | 111½ |
| Fall 1931 | 14 | 19 | 112 | 114½ |
| Spring 1932 | 16 | 20 | 109 | 109 |
| Fall 1932 | 22 | 20 | 108 | 108 |
| Spring 1933 | 14 | 19 | 110 | 110 |

The range in IQ's for the 82 cases is 86 to 129. The mean is 110½. The median is 111. Nine made scores of less than 100 and twelve were rated "of superior intelligence" with IQ's exceeding 119. Members of the first three classes reported were examined by means of the familiar Binet-Simon Scale: those of the last three classes, by means of the Otis Intelligence Scale (Advanced Examination: Form A). The raw scores from the Otis test were converted in Binet IQ equivalents according to the method described by Otis.[1]

[1] It may be remarked that these data seem to indicate that adults are rated slightly lower by the Otis test than by the Binet. The small number of cases and the slight differences of mean scores render the trend of little statistical significance.

The statistical portion of this paper concerns twenty cases of students admitted with the Fall 1931 and the Spring 1932 classes. Thirty-five entered with the classes but fifteen resigned early in the training period. The following data were used in the twenty cases treated intensively: (a) class grades, (b) supervisors' ratings, (c) psychological scores, (d) chronological ages and (e) intelligence quotients. The average class grade score was taken as an index of academic achievement; the average of two ratings made by three ward supervisors, working independently and using a 1 to 5 scale, as an index of success in the "practical" or bedside phase of nursing. The psychological scores represent in quantitative terms the judgments of the psychologist as to the probable general fitness of the candidate for nursing work. This evaluation was made after a thirty to sixty minute personal interview, and purports to rate the "whole" person, stressing emotional factors. The psychological score might be called a single-interview-impression score. The last birthday was used as the chronological age. The mental ages for the twenty cases would show the same rankings as their respective IQ's, since a basic life age of fourteen years was used in each case for deriving the latter scores.

Table I shows the rank positions occupied by each of the twenty students in grades, supervisors' ratings, general success, psychological score, age, and intelligence. The supervisors' ratings and the grade rankings were combined (with the scores weighted to equalize the variability of their respective distributions) to form the general success scores. The low or "success" rankings go with the high scores according to the usual procedure. Thus, student 4 is a consistent "failure," being below average in each distribution; while student 5 is favorably ranked, excepting for chronological age.

Rank order correlations were obtained for each distribution with certain of the other distributions. *Rho* is

TABLE I

*Rank Positions*

| Student | Grades | Averaged Supervisors' Ratings | General Success Ratings | Psychological Score | C.A. | IQ |
|---|---|---|---|---|---|---|
| 1 | 12 | 20 | 13 | 16 | 8½ | 4 |
| 2 | 3 | 17 | 6 | 10 | 5½ | 16½ |
| 3 | 15 | 15 | 16 | 12½ | 20 | 6½ |
| 4 | 20 | 19 | 20 | 18½ | 15 | 13 |
| 5 | 5½ | 1 | 3 | 1 | 15 | 4 |
| 6 | 7 | 2 | 5 | 5½ | 8½ | 9 |
| 7 | 19 | 11 | 19 | 18½ | 2 | 4 |
| 8 | 18 | 5 | 17 | 17 | 4 | 20 |
| 9 | 1 | 6 | 1 | 2 | 15 | 11½ |
| 10 | 13 | 7½ | 11 | 12½ | 15 | 1 |
| 11 | 17 | 16 | 18 | 20 | 5½ | 18 |
| 12 | 8 | 3 | 8 | 9½ | 15 | 9 |
| 13 | 11 | 13 | 12 | 14½ | 2 | 6½ |
| 14 | 4 | 10 | 4 | 3½ | 15 | 2 |
| 15 | 9 | 7½ | 9 | 9½ | 8½ | 11½ |
| 16 | 16 | 4 | 14 | 14½ | 15 | 19 |
| 17 | 5½ | 12 | 7 | 5½ | 8½ | 9 |
| 18 | 14 | 18 | 15 | 3½ | 15 | 14½ |
| 19 | 2 | 9 | 2 | 9½ | 2 | 16½ |
| 20 | 10 | 14 | 10 | 9½ | 15 | 14½ |

used throughout the study in place of *r* because the number of the cases is small.

A study of the reliability of the supervisor's ratings was made by asking for re-ratings after a lapse of two months time. The same directions and procedures were followed as were used in making the original scores. Table II indicates that the ratings are of sufficient reliability for the purposes of this study.[2]

[2] Table of Probable Errors for *rho* values with 20 cases:

| *Rho* | P.E. | *Rho* | P.E. |
|---|---|---|---|
| .00 | .15 | .60 | .10 |
| .20 | .15 | .80 | .06 |
| .40 | .13 | .90 | .03 |

TABLE II

*Correlations of Repeated Supervisors Ratings*

| | |
|---|---|
| Supervisor A | .86 |
| Supervisor B | .90 |
| Supervisor C | .85 |
| Three Supervisors | .85 |

Since the writer made no effort to remember the individual candidates it was impossible to check the reliability of the psychological scores. It was thought unnecessary to make a reliability study of the other measures.

Table III summarizes the present statistical findings:

TABLE III

*Correlations of the Measures*

| | Supervisors' Ratings | Psychological Score | C.A. | IQ |
|---|---|---|---|---|
| Grades | .30 | .78 | .05 | .14 |
| Supervisor Ratings | | .40 | .01 | .06 |
| General Success Ratings | | .81 | —.01 | .18 |
| Psychological Score | | | —.30 | .24 |

Excepting two, none of the coefficients in Table III can be considered "high." Only the psychological score rankings with grades and with the general success scores show an appreciable association.

Chronological age and mental ability show a negligible correlation with grades, ward ratings, and the general success measure. The low correlation between grades and IQ is interesting. This finding emphasizes the need to know about other factors, *i. e.*, factors other than "native" intellectual ability which make for or against academic success in nursing training. The younger girls were preferred in the psychological ratings, but the correlation coefficient of –.30 shows that this tendency was by no means consistent. The more intelligent girls tended

to receive higher psychological ratings, indicating that the latter was not a measure of "emotionality" or "personality" entirely apart from "brightness."[3] There is some agreement—correlation coefficient of .40—between the ratings of the supervisors and the psychologist. Table I reveals wide differences of opinion in individual cases: several of these will be discussed in detail later.

While the psychological scores rank with fair accuracy the candidates studied, it was desired that some means be found to select the "right" students more quickly and more certainly than was possible through individual interviews. With this purpose in mind the Thurstone Personality Schedule (1929 edition)[4] was administered to the same group of students.[5] This schedule, consisting of some 223 selected "personality questions," is described as a measure of neurotic tendencies. It is designed to distinguish the well-adjusted from the poorly-adjusted members of a given group. In applying this scale to classes of student nurses it was assumed that those falling below the average in their work would tend towards the neurotic classification, while those succeeding in the school would be selected as well-adjusted persons by the scale. Just the opposite tendency was discovered. The five students ranked at the top of the group by the general success scores (grades and ward work ratings) marked from 38 to 56 (mean 47) items in an unfavorable or "neurotic" fashion: the five ranged at the bottom of the group marked from 10 to 42 (mean 23) items in a similar way.

An examination of the figures shows that those tend-

[3] Many studies have established the general "law" that personality traits are positively correlated—that there is a tendency for "high" or "low" abilities in various fields to be associated in individuals.

[4] For a full description of the Schedule see the *Journal of Social Psychology*, Vol. 1, No. 1, Feb. 1930.

[5] Less five students who resigned.

ing towards the "neurotic" end of the Thurstone scale received higher classroom grades, higher ratings for ward work, higher IQ's, and higher psychological scores than those tending towards the "adjusted" end of the same scale.[6] Superficially, the conclusion is that success in nursing training is associated with a neurotic makeup. This writer prefers to think that the Thurstone Schedule is more a measure of honesty and naïveté than of neuroticism. Of course these findings and impressions need to be checked by a study of a large number of cases.

When the students were asked to rate each other, it was found that their preferences tended to agree (rank order correlations from .35±.15 to .51±.13) with the rankings of the ward supervisors and the psychologist. Negative correlations were found to exist between the student ratings and the Thurstone Personality Schedule scores, thus lending further support to the opinion that the Schedule measures other factors than personality maladjustments.

A few tentative conclusions derived from the statistical analysis may be listed at this point. The study of individual cases will form a check for the final summary. The findings so far seem to indicate that:

1. Life age within the range of 17 to 23 years is not an important factor statistically in the success of students in a nurses' training school (*Rho* = — .01±.15);
2. Intelligence within the range of IQ 86 to IQ 129 is not an important factor statistically in success in nursing training (*Rho* = .18±.15);
3. A qualified psychologist after a thirty to sixty minute interview can predict with some accuracy the probable success of a candidate in nursing training (*Rho* = .81±.06);
4. Personality factors apparently are of first importance in determining success in nursing training;

[6] On the basis of his original work Thurstone reports a negative correlation between scores on the Personality Schedule and class grades. Thurstone's explanation that the "neurotic" students probably had fewer social distractions than their well-adjusted classmates is not entirely convincing.

5. The Thurstone Personality Schedule seems to favor the less successful candidates in nursing training: the present data suggest that the Schedule measures some factors other than personality maladjustments;

6. Students' ratings of fellow-classmates tend to agree with supervisors' and a psychologist's opinions and to disagree with ratings obtained by the Thurstone Personality Schedule.

Eighteen of thirty-five girls who matriculated with the Fall, 1931 and the Spring, 1932 classes resigned. Eight dropped out voluntarily and ten were asked to leave. Of the former group four pleaded nostalgia, one poor physical health, one poor mental health, one an emergency home situation, and one an inability to succeed in the work assigned. The administration lists the following reasons as responsible for the failure of the ten girls who were asked to resign: academic failure, six cases; failure in the practical work on the wards, three cases; infraction of hospital rules, one case. It is stated further that no girl dropped as an academic failure was doing satisfactory ward work, and that one of the three girls dismissed as a ward failure was also behind in her studies. Only one girl doing satisfactory ward work was asked to resign. The average of five grades of the one girl resigning voluntarily as a "general" failure was 70.20: the average of four to ten grades of the six girls who were asked to resign as academic failures was 70.96. The passing grade is 75. There is no appreciable difference in either the ages or the IQ's of the resigning and succeeding groups. The mean IQ of the six girls dismissed as academic failures was 107, a figure just four points under the mean of the two classes. Since the mentalities of these six girls must be considered adequate, it is necessary to look further for the "real" causes of their failure. Probably classroom difficulties frequently are symptomatic of underlying emotional disturbances. Granting this, one result is that the workability of the individual for attending to "outside" con-

siderations is reduced by being diverted to an attempt to resolve "inside" conflicts. The mean psychological score of the classes was 14.3: of those resigning involuntarily, 12.75; of those resigning voluntarily, 10.0. Only two of the resigning group (both involuntary resignations) were given psychological scores higher than the mean of the classes. No girl who left or was dropped for failure in ward assignments attained an average or better-than-average score on the combined ratings of the three supervisors. It should be noted that these ratings were made after the girls had left: the halo effect of failure doubtlessly is present in these scores. No girl who resigned voluntarily remained longer than three months in the school and the average period of residence for this group was one and a half months. Two of the ten girls asked to resign had received eight months of training, another had received six months, and the average period for this group was just under four months. An aggregate period of four years was "lost" by the group of eighteen resigning girls.

This brief analysis of resignations yields the following summary of conclusions:

1. Nostalgia is the chief cause of voluntary resignation, accounting for half the cases in this group;
2. Voluntary resignations tend to occur during the first three months of training;
3. Involuntary resignations tend to be delayed somewhat beyond the average time of voluntary resignations;
4. Academic failure is the reason given for the largest number of involuntary resignations. However, since accepted tests show these cases to have IQ's comparable with those doing satisfactory class-room work, it is believed in these cases that academic failure is often merely a symptom of an underlying and unresolved emotional disturbance;
5. In three of ten cases ward failure is listed as the chief cause of involuntary resignation: in six additional cases it is given as a contributing cause;
6. There is no significant difference in the ages or the IQ's of resigning and succeeding students;

7. The psychological score of resigning students is below that of succeeding students: the psychological score of students resigning involuntarily is above that of those leaving of their own desire;
8. A serious loss of time is represented by resigning students.

The results of the study to this point are largely of a negative character. It has been found, for example, that there is little association of high scores on intelligence tests with success in nursing training.

To give precisely and completely the reasons why a certain girl succeeds or fails in training it is necessary to know a great deal about that particular girl. The causes which the individual or the school administration name as responsible for success or failure cannot always be accepted without further analysis. This conclusion is based on the study of individual cases.

If it is true that an accurate statement of the underlying causes of adjustment to nursing training depends upon thorough personality studies, it follows axiomatically that the same procedure is required to select the "right" candidates for training. A review of a few cases will give perspective to this discussion and will serve the purpose of throwing emphasis upon those personality traits which seem most commonly associated with succeeding and failing students.

*Case 1.* This girl of 18 was seen shortly after entering training. The report, in part, to the director of the school is as follows:

"Physically, this girl has a palpable thyroid with some increase in pulse rate and other minor findings . . . . indicative of a thyroid condition. In addition to this she has a basal metabolism of —7.

"Mentally, she gives the history of a 'nervous breakdown' in which there is a clear history of a depression lasting over a period of nearly three months. She also states that from time to time she has periods in which she feels tremendously worried, has difficulty in thinking and becomes 'mixed up.'

"Psychometric examination shows her to have a mental age of twelve years and seven months and an intelligence quotient of 90 (using the 14 year chronological age).

"Our interpretation and opinion regarding the above positive findings is that this girl is not sufficiently well, either physically or mentally to be able to successfully complete a course in nursing."

This case was the most severe of any seen. Her physical health was poor; she was emotionally unstable; and she was retarded intellectually. Obviously this girl should never have been admitted to a school of nursing.

Cases 2 and 3 represent instances of very serious emotional difficulties. Both left school soon after matriculating.

Miss A. resigned voluntarily. The director of the school reports the reason as "ill health, verging on a nervous breakdown." The report, in part, of the psychologist in this case follows:

"It is my opinion that Miss A., while an exceptionally good student (IQ 125), has neither the physical basis nor the emotional balance for success in nursing. Her history (given by Miss A.) includes at least two 'nervous breakdowns.' She is easily annoyed by others, reflecting personality difficulties of her own. In short, it is difficult to conceive a vocation for which Miss A is more poorly fitted than for the intensive, rigorous demands of nursing."

The resignation of Miss B. was requested on the basis of academic failure. The full report in this case follows:

"This girl's life has been a series of emotional upsets, beginning in the earliest years and extending to the present time. Just now (the first month after entrance) it is reported that she is failing rather badly in the academic phase of the work. Since she is above the average of the group intellectually (IQ 112), it is evident that personality difficulties are responsible. Miss B. is unable to resolve these alone, and it is believed that she is in need of psychiatric help. If she can be held in training, consultations with this office will be arranged as frequently as possible in the hopes of carrying her through the present emergency."

Miss B. was seen by both the psychiatrist and the psychologist several times after the original interview

upon which the above statement was based. While it was not believed that she would make a good nurse, it was hoped that she could be helped to see her own difficulties and make more appropriate plans for the future. Her work in the school did not improve nor was there noticeable change in her emotional state.

The third group of cases (Cases 4, 5, and 6) includes those of immature or unstable emotional development. None was "recommended" by the psychologist and none proved successful in the school. Excerpts from the reports to the director reveal some of the factors associated with failure in this group.

*Case 4.* "Miss C. is an attractive, immature girl of eighteen years. She is exceedingly naïve and reveals very little understanding of the specific requirements of her new work. An ideal of service, amounting almost to asceticism, motivates her activity which, unfortunately, became directed into nursing work. She is unhappy in our school, and there is considerable doubt that she can succeed in the classes.

"That Miss C. has some appreciation of her own difficulties and is unaccustomed to making independent decisions is revealed by her frank admission, 'If my mother were here, I bet I'd know what to do.' She was an only child for nine years and there are many suggestions that her mother was over-protective of and too ambitious for her welfare. Miss C. states that she would have become a cloister nun had not her father over-ruled."

*Case 5.* "There are many factors which may explain why Miss D. is finding it difficult to adjust satisfactorily to the routine and requirements of her new work; (a) she is the only ——— [an identifying classification] girl in the class; (b) one fails to find personality traits which would attract others to her; (c) she is away from home—'on her own'—for the first time in her life.

"The present examiner feels that Miss D. will require longer than the usual time to adjust to the hospital routine and that her success in working with patients will never be outstanding."

Miss D. stood in the lowest tenth of the group for both ward work and academic achievement when her resignation was requested. Her IQ was four points above the mean of the class.

*Case 6.* "This girl's personality at the present time is unsuited to the patient, exacting demands of the nursing profession and it is our recommendation that she be released from the school."

This is the full report in the case of Miss E. She began talking as she entered the examining room and it was impossible to conduct the interview in the usual way. She showed great excitability, noted and commented upon various objects in the room, and made crude passes to the examiner whom she had not seen prior to this period. It was felt that Miss E. was bordering on a psychotic state: her erratic, impulsive behavior in the school seemed to support this impression. Her resignation was requested on the basis of her poor ward work. It should be added that Miss E. was one of the youngest girls ever to be admitted to the school.

In the fourth group of cases the "borderline" individuals are located. Here are the candidates of "colorless" personalities and "low" IQ's. Generally these girls were not recommended for entrance or continuation in the school. One of three representative cases, selected for presentation here, has been retained in the school and is making a satisfactory record. The single interview probably is a less accurate instrument for predicting success in these cases than in any of the others.

*Case 7.* "During a greater part of the interview Miss F. seemed somewhat self-conscious and nervous. After the psychometric examination she remarked, 'Well, now I guess you know how dumb I am.' Being assured that she was of average mentality did not seem to help much.

"Miss F. states that she likes the work of the school and believes that she can succeed in it. With an IQ of 105 it is certain that she will have to apply herself diligently in order to keep pace with the group. No personality difficulties, which might prove serious vocational handicaps, were noted."

Miss F. was doing average work in her classes and on the wards when she resigned voluntarily at the end of

three months of training. She stated that she was "homesick."

*Case 8.* "There is little to recommend Miss G. for continuation in training. Her mental level (IQ 102) is below the average of the group, and it is doubted that it is adequate to the demands of the profession. During the interview Miss G. talked little, answering questions with a 'Yes' or 'No' whenever possible. Her emotional tone appeared colorless and she revealed no personality traits, such as tact or cheerfulness, which would prove of value in working with sick persons."

Miss G.'s grades and ward-work scores were below the average of the class but her progress was considered satisfactory for several months: after this period she began to fail rather badly and her resignation was requested.

*Case 9.* "Miss H. was uneasy during the interview. She expressed feelings of inferiority. With an IQ of 95 it is most likely that she will experience difficulties in the theoretical phases of training. Miss H. is somewhat older and more mature than the average of the group and it is believed that these factors will prove of help in effecting an adjustment in the school. Her best service will probably be in the performance of routine assignments: it is doubted that she will bring much leadership or imagination to her work."

A recent report from the director of the school indicates that the above statement in the case of Miss H. was substantially correct. It is reproduced in full:

"Scholastically, one might say that Miss H. is a 'plodder.' She tries very hard with the result that in her preliminary term she just managed to 'get through,' especially in the sciences. However, Miss H.'s class work of this semester showed marked improvement. The student's merit in the practical work is commendable; in fact, one would say that among all the students, Miss H. is doing one of the most outstanding pieces of work in bedside nursing. In her ward situations she demonstrates poise and intellect."

The statistical record shows that Miss H. was rated sixth best in ward work. She stood third from the lowest of those making satisfactory class grades.

One case was recommended "on condition:"

"Though physically mature Miss I. impresses one as slightly adolescent in her attitude towards responsibilities. She has considerable energy and ability and the chief problem will be to supply appropriate outlets. . . . . No emotional conflicts were noted and it is believed that if Miss I. can be challenged in her work and carried through the present period of restlessness, she will develop into an excellent nurse."

The last report indicates that Miss I. is happily adjusted in the school. While her class-room work is slightly below average, she is rated as one of the most capable student nurses on the wards.

Cases 11 to 16 comprise the final group, those fully recommended. These persons are representative of those whom the examiner felt would make better-than-average records. In five out of the six cases presented the candidates have made outstanding successes: the resignation of the sixth was requested, despite a splendid record, after a violation of a hospital rule.

*Case 11.* "Miss J. is a quiet, stable person who can be expected to perform her work willingly and efficiently. No personality difficulties were noted during the interview and the findings are so consistently negative that a more extended report seems unnecessary."

The statistical tables place this girl ninth in IQ, sixth in psychological score, seventh in grades, and second in ward work.

*Case 12.* "Miss K. is an attractive, well-adjusted person who will probably be a leader of the group she is associated with at the hospital. . . . . There is every indication that Miss K. will be successful in her work."

The records in this case are: fourth in IQ, first in psychological score, fifth in grades, and first in ward work.

*Case 13.* "Although Miss L.'s native endowments do not appear outstanding, she is working up to the limits of her abilities and it

is our belief that she will prove herself a conscientious and capable worker. There are no evidences of emotional difficulties."

The records show: sixteenth in IQ, ninth in psychological score, second in grades, and ninth in ward work. It is particularly interesting to note the high quality of work that Miss L. is doing with a relatively low IQ (IQ 105).

*Case 14.* "Highest on the psychometric examination (of own class group), of attractive appearance, and stable emotionally, Miss M. should be outstandingly successful in the nursing profession."

The records place Miss M. second in IQ, third in psychological score, fourth in grades, and eleventh in ward work.

*Case 15.* "Miss N. is alert, friendly, resourceful. . . . . Her record here and elsewhere will probably be of superior grade."

According to the records she stands tenth in IQ, fifth in psychological score, sixth in grades, and tenth in ward work.

*Case 16.* "Miss O. is a diminutive, responsive person who seems happy and well adjusted in her present work. She has personality traits which attract others to her and which should contribute greatly to her vocational success. Intellectually she is close to the average of her group and should be able to maintain a satisfactory position throughout the training period."

After eight months of training Miss O. was asked to resign from the school as a consequence of violating a hospital rule. Her statistical scores at this time ranked her as follows: eleventh in IQ, second in psychological score, first in grades, and fourth in ward work. Using grades and the ward work ratings as the criteria, Miss O. stood at the top of her class.

In conclusion, some of the more important findings of the study may be set down. No attempt should be made to extend the results of this investigation into general

principles applicable to other populations and situations. Briefly, this survey of this particular group suggests that

1. Age (within the range, 18 years to 23 years) is not an important factor of success in nursing training. (*Rho* with grades = .05±.15; *rho* with supervisors' ratings = .01±.15.)
2. Intelligence (within the range, IQ 86 to IQ 129 is not an important factor of success in nursing training. (*Rho* with grades = .14±.15; *rho* with supervisors' ratings = .06±.15.)
3. It is unnecessary to give each student an individual psychometric examination.
4. A qualified psychologist after a thirty to sixty minute personal interview can predict with some accuracy the probable degree of success of a student in nursing training. (*Rho* with grades = .78±.06; *rho* with supervisors' ratings = .40±.13; *rho* with combined grades and supervisors' ratings, a general success measure, = .81±.06.)
5. Three nursing supervisors, working independently and using a 1 to 5 rating scale, can rank with "high" accuracy twenty students whom they have had under daily observation. (*Rho* for re-ratings after an interval of two months with the original scores = .85±.04.)
6. The Thurstone Personality Schedule seems to favor the less successful candidates in nursing training: the present data suggest that the Schedule measures some factors other than personality maladjustments.
7. Students' ratings of fellow-classmates tend to agree with supervisors' and a psychologist's opinions and to disagree with ratings obtained by the Thurstone Personality Schedule.
8. Nostalgia is given as the chief cause for voluntary resignations.
9. Voluntary resignations tend to occur during the first three months of training: if a student survives this period and succeeds with his work it is likely that he will complete the course.
10. Academic failure is the reason given for the largest number of involutary resignations: however, since the IQ's of this group compare favorably with those of succeeding students, it is believed in these cases that emotional difficulties were basic to failing classroom work.
11. Almost all the students asked to resign were reported to be doing inferior work on the wards.
12. The mean psychological score of voluntarily resigning students was 10.00; of involuntarily resigning students, 12.75; of the entire group 14.30.

13. There is no statistically important difference between the chronological or mental ages of the resigning and succeeding groups.

14. An aggregate period of four years of training was "lost" by the eighteen resigning students.

15. The relatively high mortality (fifty per cent for the two classes studied) due to resignations emphasizes the need for a more careful selection of students at the time of entrance.

16. A review of individual cases focuses attention on the importance of emotional balance and maturity as factors of success in nursing training.

# A COMPARISON OF THE INTELLIGENCE QUOTIENTS OF THREE DIFFERENT MENTAL TESTS APPLIED TO A GROUP OF INCARCERATED DELINQUENT BOYS[1]

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The Kuhlmann-Anderson Intelligence Tests were used in the course of an investigation to determine the status of the mental and physical development of incarcerated delinquent white and negro boys. At one of the institutions visited (St. Charles School for Boys, St. Charles, Illinois) records were made available which gave the mental ages obtained for each boy in that institution by the Otis Group Test and for sixty-two boys by the Stanford Revision of the Binet-Simon Tests.[2] Kuhlmann (1928) has published the results of a comparison between the Kuhlmann-Anderson Tests and of several other group tests given to public school children. However, in so far as is known, the Kuhlmann-Anderson Tests have not previously been employed with a group similar to that of the present study.

Groups of from ten to twenty boys between the ages of ten and sixteen years were tested by the Kuhlmann-Anderson methods after the anthropometric measurements had been completed on all the subjects. The test battery used was determined by the ages and school

[1] The author wishes to acknowledge aid given to this investigation by the Rockefeller Foundation.

[2] The author wishes to express his appreciation to the director and members of the staff of the St. Charles School for Boys for their permission to carry on the investigation and for the cooperation received while doing so.

grades of the individuals composing the groups. The tests were later scored and the mental ages and IQ's determined. In each case the Otis Group Test and the Stanford Revision of the Binet-Simon Tests had been applied by a competent psychologist of the Institute of Juvenile Research of Chicago. The Kuhlmann-Anderson Tests were conducted by the author.

In Table I are shown the means of the IQ's derived from the several tests on sixty-two boys, together with the S. D., the coefficient of variability and the range.

TABLE I

*The Mean IQ of 62 Incarcerated Delinquent Boys*

| Test | Mean | S. D. | Coef. of V. | Range |
|---|---|---|---|---|
| Otis (group) | 87.15±1.14 | 13.26±0.80 | 15.22±0.92 | 64-121 |
| Binet-Simon (individual) | 76.94±1.07 | 12.51±0.76 | 16.26±0.98 | 53-110 |
| Kuhlmann-Anderson (group) | 76.74±1.02 | 11.88±0.72 | 15.48±0.94 | 55-105 |

The results indicate a close agreement between the mean IQ obtained by the Binet-Simon test and that determined by the Kuhlmann-Anderson Tests. The mean IQ as determined by the Otis test is about 10 points higher than those of the other two tests. The differences in the ranges likewise indicate that the Otis test gives an IQ somewhat higher than those of the Binet-Simon and Kuhlmann-Anderson tests. All of the tests show about the same degree of variability.

Kuhlmann (1929) has shown that the Pearson $r$ cannot be relied upon to represent the true relation between the mental ages obtained by employing different tests and suggests the use of several other methods. He states: "The average difference in IQ's between two series of measures by two test batteries would be a far better index of agreement than the Pearson $r$ at any

mental level." The results obtained by Kuhlmann's method are shown in Table II.

TABLE II

*The Mean Difference in IQ's of 62 Incarcerated Delinquent Boys*

| Tests | Mean | S. D. | Coef. of V. | Range |
|---|---|---|---|---|
| Otis-Kuhlmann-Anderson | 10.47±0.56 | 6.56±0.40 | 62.66±3.80 | 1-26 |
| Otis-Binet-Simon | 10.95±0.59 | 6.93±0.42 | 63.39±3.84 | 0-27 |
| Binet-Simon-Kuhlmann-Anderson | 5.26±0.32 | 3.69±0.22 | 70.15±4.25 | 0-17 |

These results indicate that about the same difference exists between the IQ of the Otis and the Kuhlmann-Anderson (10.47) and that of the Otis and Binet-Simon (10.95) test. There is, however, a much closer agreement between the results obtained by the Binet-Simon and the Kuhlmann-Anderson (5.26) tests than between either of them and the Otis test.

From the above data one may be justified in concluding that the IQ's found by the Kuhlmann-Anderson Intelligence Tests are reliable, and may assume that by the use of these tests a fair index of the IQ's of the inmates of the institutions visited has been determined. One must also conclude that the Otis group test does not give results (as compared with an accepted individual test) which are as accurate as are those of the Kuhlmann-Anderson Tests; the IQ obtained by the Otis test appears to be about ten points too high.

The full record, nearing completion, of the study of the entire series of delinquent boys by the use of the Kuhlmann-Anderson Intelligence Tests will be published at a later date.

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# THE RELIGIOUS BELIEFS OF COLLEGE STUDENTS

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In this period of religious readjustment many thoughtful individuals are wondering about the religious beliefs and attitudes of college students. They are wondering if religious fervor, which was so evident in youths two generations ago, has been annihilated or if young people still do hold religious convictions of which they are unashamed. It is the purpose of this study to throw some light upon this problem and to ascertain the nature and extent of the religious beliefs of college freshmen and college seniors.

The mode of attack on the problem was as follows. All of the freshmen who matriculated at the following colleges: Baldwin-Wallace, Coe, Dubuque University, Milton, Monmouth and Ripon, at the beginning of the school year of 1930-31 were confronted with a series of twenty-five religious propositions and concepts. Since the freshmen made their response to the propositions before they attended a single lecture or during the first week of academic instruction, their judgments were not influenced by the college but were made in accord with the beliefs which they brought to college from their various communities. Thus the factor of influence of college instruction upon student beliefs was eliminated, and because of this elimination the group including a total of 852 freshmen remained a more or less unselect group. The seniors of seven mid-western colleges, including Baldwin-Wallace, Coe, Huron, Illinois, Milton,

Monmouth and Ripon, who participated in this investigation were confronted with the same list of propositions in the spring of 1930, and thus almost at the close of their college course. Since the test was administered near the close of the students' senior year, their judgments were influenced, no doubt, to a certain extent by four years of college instruction. Although it would be interesting to know the extent to which this instruction influenced their beliefs, this is not our problem. Our problem is: What are the religious beliefs of college seniors and how do their beliefs differ from those of college freshmen?

Each student was confronted with a printed list of twenty-five religious propositions. To the right of the statement of each proposition, which was stated briefly, clearly and affirmatively, were five groups of parentheses labeled from left to right, A, B, C, D and E. The list of propositions was prefaced with the following instructions:

Opposite each of the following propositions make a cross (X), in one of the five columns, according to your belief.

Under A if you implicitly believe.

Under B if you are inclined to believe, but doubt.

Under C if you do not know whether you believe or do not believe (non-committal).

Under D if you are inclined to disbelieve and doubt.

Under E if you absolutely do not believe.

Thus any one of five possible answers could be given to each proposition. This is a distinct advantage, for the student could not only express indifference or a non-committal attitude and belief or disbelief, but also within certain limits the extent of his belief or disbelief.

In order to make certain that the responses checked by the students did express their beliefs and not merely momentary whims, a group of 97 freshmen were given a second list of religious propositions which contained

the same propositions except that the statement of each was contrary to that of the first list. Thus if a student marked a proposition "A" in test one, he marked it "E"

TABLE I

*College Freshmen*
*List of Religious Propositions and Distribution of Responses Indicated by Per Cent.*
*(852 cases)*

| | Propositions | A | B | C | D | E |
|---|---|---|---|---|---|---|
| 1. | Ten commandments should be obeyed | 92 | 04 | 03 | 00 | 01 |
| 2. | Existence of God | 88 | 08 | 03 | 01 | 00 |
| 3. | Existence of the soul | 81 | 10 | 05 | 02 | 02 |
| 4. | Divinity of Jesus Christ | 82 | 07 | 07 | 02 | 02 |
| 5. | Christ died to save sinners | 81 | 07 | 08 | 01 | 03 |
| 6. | Power of prayer | 75 | 15 | 06 | 02 | 02 |
| 7. | Forgiveness of sin | 77 | 12 | 06 | 02 | 03 |
| 8. | Reality of sin | 73 | 12 | 10 | 02 | 03 |
| 9. | Sunday is an holy day | 77 | 09 | 06 | 02 | 06 |
| 10. | Virgin birth of Christ | 72 | 12 | 09 | 03 | 04 |
| 11. | Fatherhood of God | 68 | 15 | 12 | 02 | 03 |
| 12. | Genuineness of Christ's miracles | 69 | 15 | 09 | 04 | 03 |
| 13. | Bible is the word of God | 69 | 15 | 07 | 04 | 05 |
| 14. | Holy spirit | 66 | 12 | 15 | 03 | 04 |
| 15. | Existence of heaven | 66 | 15 | 09 | 04 | 06 |
| 16. | Sacrament of baptism | 59 | 13 | 17 | 04 | 07 |
| 17. | Immortality | 56 | 16 | 17 | 04 | 07 |
| 18. | Man is saved by faith, not by works | 56 | 16 | 15 | 04 | 09 |
| 19. | A day of final judgment | 55 | 15 | 14 | 05 | 11 |
| 20. | Resurrection of the body | 53 | 15 | 15 | 06 | 11 |
| 21. | Existence of angels | 43 | 18 | 16 | 09 | 14 |
| 22. | Existence of hell | 44 | 18 | 14 | 07 | 17 |
| 23. | Existence of the devil | 39 | 17 | 12 | 10 | 22 |
| 24. | World was created in six solar days | 38 | 15 | 19 | 09 | 19 |
| 25. | Present-day miracles | 30 | 23 | 18 | 11 | 18 |

in test two if he were consistent in his belief. The results of the two tests were correlated and the coefficient proved to be .931, which indicates that the students did

know what they believed and that their responses in test one are reliable.[1]

The first question which we have before us is: What are the religious beliefs of college freshmen? Are they greatly inclined to believe the propositions submitted, which may be found in Table I; is there internal consistency in their beliefs, or are they greatly inclined to disbelieve? Are they conservative, non-committal or non-conservative? The results obtained for the 852 freshmen who participated in this investigation are given in Table II, which indicates the per cent of belief and disbelief for the average student in the whole group and in particular denominations.

TABLE II

*College Freshmen*

*Per Cent of Propositions Believed*

| Denomination | No. of Cases | A | B | C | D | E |
|---|---|---|---|---|---|---|
| All denominations | 852 | 65 | 13 | 11 | 04 | 07 |
| United Presbyterian | 72 | 79 | 11 | 06 | 02 | 02 |
| Lutheran | 76 | 78 | 12 | 05 | 02 | 03 |
| Roman Catholic | 53 | 79 | 08 | 08 | 02 | 03 |
| Baptist* | 54 | 69 | 12 | 10 | 04 | 05 |
| Presbyterian | 155 | 67 | 13 | 11 | 03 | 06 |
| Methodist | 207 | 62 | 16 | 12 | 04 | 06 |
| Miscellaneous | 106 | 59 | 12 | 11 | 05 | 13 |
| Congregational | 89 | 50 | 17 | 14 | 05 | 14 |
| No denomination | 40 | 39 | 13 | 23 | 07 | 18 |

Taking the group as a whole, each of the 852 freshmen implicitly believed, on the average, 65 per cent of the religious propositions, each was inclined to believe 13 per cent, was non-committal on 11 per cent, was in-

* Including Seventh Day Baptist.

[1] For a more detailed account of the technique used see Dudycha, G. J.: "The Religious Beliefs of College Freshmen", *School and Society*, 31: 206-208, February 8, 1930.

clined to disbelieve 4 per cent, and absolutely disbelieved 7 per cent. In other words, each individual, on the average, marked sixteen propositions A, three propositions B, three propositions C, one proposition D and two propositions E. Table II is to be read for each denomination in the same way. It will be observed that the United Presbyterians and Lutherans had the largest per cent of A's and B's, the greatest per cent of belief (the Lutherans are placed second because their disbelief is larger than that of the United Presbyterians), the Roman Catholics were third, Baptists including Seventh Day Baptists fourth, Presbyterians fifth, Methodists sixth, the miscellaneous group composed of Brethren, Christian, Christian Science, Church of Christ, Episcopal, Evangelical, Friends, International Bible Students of America, Jewish, Moravian, non-denominational groups, Reformed, Universalist, and Unitarian seventh, Congregationalists eighth, and those who did not indicate any denomination ninth.

Upon further examination of Table II, we find that for the whole group of 852 freshmen 78 per cent of the propositions are believed, and for the denominations the range is from 90 per cent, in the case of the United Presbyterians and Lutherans, to 52 per cent, in the case of those who did not indicate any denomination. This leaves the range for disbelief and non-committal from 10 per cent, in the case of the United Presbyterians and Lutherans, to 48 per cent, in the case of the "no denomination" group. Another interesting observation which we may make from a consideration of these results is that as disbelief increases the per cent of non-committal also tends to increase. From our consideration thus far what may we conclude? College freshmen firmly believe or are inclined to believe the greater per cent of the twenty-five religious propositions submitted.

No doubt the reader has been anxiously looking forward to a consideration of the response to particular

propositions. In Table I the propositions appear in their order of rank as determined by the score.[2] The numbers which appear at the right of each proposition indicate the per cent of the total number of 852 freshmen who marked the propositions A, B, C, D or E.

It is rather interesting to note that the proposition which ranks first, being believed by 96 per cent of the freshmen, is, "The ten commandments should be obeyed." Apparently the instructions of these students has been such that if they believe anything, they certainly believe in the "ten commandments." In view of the high rank of this proposition, we are led to wonder whether their behavior conforms to this moral code and also whether a large or small per cent of the 818 freshmen who marked this proposition A or B could tell us what the "ten commandments" are. The answers to these queries, however, are not to be found in our results. A close second to the first proposition is the "Existence of God," also believed by 96 per cent of the students although the per cent of absolute belief is not as great. No other proposition in the list is believed to as great an extent and disbelieved as slightly as these two. Also we note a gap of five per cent between these two propositions and the third highest, "Existence of the soul."

The propositions which are ranked third through seventh—"Existence of the soul," "Divinity of Jesus Christ," "Christ died to save sinners," "Power of prayer" and "Forgiveness of sin"—believed by from 88 to 91 per cent of the freshmen, constitute a group of beliefs which have long been considered fundamental Christian tenets. It is noteworthy that the divinity of Christ and the mission of Christ are ranked together, but that the proposition dealing with the virgin birth of

[2] The score for each proposition was determined by giving each response a value as follows: A plus 2, B plus 1, C zero, D minus 1 and E minus 2.)

Christ is in the tenth place and believed by 84 per cent of the students. Another point of interest is that the two propositions which deal with sin—the forgiveness of sin and the reality of sin—are ranked together, the one being believed to a slightly greater extent than the other. A third grouping which may be observed extends from proposition eight through thirteen being believed by from 83 to 86 per cent. Again we note that 19 per cent more individuals believe in the existence of heaven than in the existence of hell. There are 690 individuals of the total number who believe in the existence of heaven and only 85 disbelieve, and although 528 believe in the existence of hell, 204 disbelieve. Perhaps the greater belief in heaven is due to the pleasantness usually associated with that concept. The proposition dealing with the existence of the devil, which received the greatest per cent of disbelief—32 per cent—was ranked next to the one dealing with the existence of hell. The two propositions which were practically tied for the lowest rank, "Present-day miracles" and "World was created in six solar days," were both believed by only 53 per cent of the freshmen tested. If the reader will consult Table I he will discover many interesting relationships which can not be pointed out specifically here.

As one would expect, there are some outstanding denominational differences. First let us consider the United Presbyterians who show the strongest leaning toward belief in the propositions submitted of any of the groups considered. They ranked "Existence of the soul," ranked third by the whole group, first, with 100 per cent of the individuals believing it. They placed "Ten commandments should be obeyed" second, and "Existence of God" fourth. For the United Presbyterians, "Sunday is an holy day" ranks third with 100 per cent of belief, whereas it is ranked ninth by the whole group. This is a marked denominational departure. Another characteristic of these results is that 99 per cent of this

group believe in the forgiveness of sin—ranked seventh —but only 92 per cent believe in the reality of sin—ranked twelfth. An evident denominational belief is found in the rank of the proposition concerning the Bible —"Bible is the word of God"—which is placed in the eighth position and believed by 96 per cent of the United Presbyterians, whereas the same proposition was given the thirteenth place and believed by only 84 per cent of the 852 freshmen.

Our next denominational group is the Lutheran. Here, too, we notice some distinctly individual beliefs. The proposition ranked first by the Lutherans is "Christ died to save sinners," which is believed by 100 per cent of the Lutherans tested. Their fourth proposition—ranked tenth by the whole group and eleventh by the United Presbyterians—believed by 98 per cent of the members of this group is, "Virgin birth of Christ." Another marked departure from the composite belief of the whole group is with regard to the existence of the soul which they ranked twelfth, although believed by 95 per cent of their group. It must be observed that although the Lutherans ranked some of the items lower than the same items were ranked by the whole group, the extent of their belief in these items is often much greater than that of the whole group.

The third group which we noted above was the Roman Catholic. As in the case of the other two denominational groups which we have already considered, the per cent of belief in the various religious propositions is for the most part very great. Although there is considerable similarity between the ranking of the propositions by the Catholics and the whole group, there are a number of significant differences which we wish to note. Ninety-eight per cent of the Catholics believe in the forgiveness of sin, which belief they ranked third, but only 91 per cent of them believe in the reality of sin. Ninety-two per cent believe in the sacrament of baptism, thus plac-

ing it in sixth place, whereas only 72 per cent of the whole group believed in this proposition which they placed sixteenth in the list. Although this group placed "Bible is the word of God" in the twentieth rank, 81 per cent believed it.

In the case of the Baptists the forgiveness of sin and the reality of sin ranked third and fourth, are believed by exactly the same per cent of the group—94 per cent. Another interesting item which is characteristic of this group is the position of "Sunday is an holy day." This proposition is ranked twenty-third by the Baptists and believed by only 61 per cent and disbelieved by 32 per cent. This is due to the fact that about half of the Baptists represented in this group belong to the Seventh Day Baptists who observe the seventh day of the week instead of the first. One might expect that belief in the sacrament of baptism would be higher than in the fourteenth place and believed by only 76 per cent of the group. This same proposition was ranked sixteenth by all the freshmen and believed by 72 per cent of them.

The beliefs of the Presbyterians and the Methodists seem to coincide quite closely with those of the entire group. Only slight differences in rank and extent of belief were noted, but no one is of sufficient significance to call specific attention to it.

The miscellaneous group consists of such a large number of minor denominations that the differences tend to cancel each other and thus we do not find anything distinctive.

The beliefs of the Congregationalists resemble quite closely those of the Presbyterians and Methodists. One item of interest, however, is that the Congregationalists are the only ones who believe more strongly in the reality of sin than in its forgiveness.

The last group, which consists of those individuals who did not indicate any denomination, exhibit less belief and more disbelief and non-committal than the other

groups. Although the rank order of the propositions as determined by this group is in many respects similar to that of the entire group of freshmen, the extent of belief is noticeably smaller and the disbelief is very evidently greater. The proposition ranked first by this group, "Ten commandments should be obeyed," is the same as that ranked first by the entire group. Although this proposition is believed by 93 per cent of the members of this group, there is no other proposition which is believed to anywhere nearly as great an extent. The second proposition, "Existence of God," is believed by only 78 per cent. Apparently the "ten commandments" have made practically as great an impression upon those who did not indicate a denomination as upon those who did. "The divinity of Jesus Christ," which was ranked high by the whole group, was placed fourteenth by the "no denomination" group.

A brief summary of the freshmen beliefs is in order. When we compare the denominational beliefs we find that the proposition which was given first place by the entire group of 852 freshmen, "Ten commandments should be obeyed," tends to be given first place by all the specific groups including the "no denomination" group. Five denominational groups gave this proposition first place, three second place, and one third place. No group ranked this proposition lower than third. From this we certainly must conclude that if the college freshmen examined have any predominant religious belief, it is that the "ten commandments" should be obeyed. Again we find considerable agreement concerning the proposition which was ranked twenty-fifth by all the freshmen, "Present-day miracles." This proposition was ranked lowest by four of the denominational groups, twenty-fourth by three, twenty-third by one, and twenty-first by one. By and large, there is about this same amount of uniformity throughout the entire list of religious propositions.

Another interesting observation is with regard to the belief in the reality and forgiveness of sin. Of the 852 freshmen, 89 per cent believe in the forgiveness of sin, and 85 per cent believe in its reality. This same relationship holds throughout for all of the denominations except for the Congregationalists, 78 per cent of whom believe in the forgiveness of sin and 80 per cent believe in its reality. Logically one would expect that belief in the reality of sin would be greater because it seems unreasonable to believe in forgiveness unless sin is a reality; but psychologically forgiveness has more personal significance and hence, no doubt, the greater belief.

Some of the denominational likenesses and differences which we have observed may be summed up briefly as follows. "Sunday is an holy day" was put in third place by the United Presbyterians (100 per cent belief) and the Methodists (93 per cent belief); but was ranked twenty-third by the Baptists (61 per cent belief). The United Presbyterians believe extensively in the Bible as the word of God. For the Lutheran, "Christ died to save sinners" and the "Virgin birth of Christ" are fundamental beliefs, whereas for the Catholics the forgiveness of sin and the sacrament of baptism are held as essential tenets of Catholicism.

The same list of religious propositions as was given to the freshmen was submitted to the seniors. This list, for the seniors, appears in Table III.

As in the case of the freshmen, we desire to know whether college seniors are conservative and institutional in their religious beliefs, or whether they tend away from institutionalism. Since college students—seniors especially—are often accused of being atheists and unbelievers, let us see if this is true and also to what extent they disbelieve, if they do. The results obtained for the 305 college seniors who participated in this investigation are given in Table IV, which indicates the per cent of belief and disbelief for the average senior in

TABLE III

*College Seniors*

*List of Religious Propositions and Distribution of Responses Indicated by Per Cent*

*(305 cases)*

| | Propositions | A | B | C | D | E |
|---|---|---|---|---|---|---|
| 1. | Existence of God | 83 | 10 | 03 | 03 | 01 |
| 2. | Ten Commandments should be obeyed | 76 | 12 | 06 | 02 | 04 |
| 3. | Divinity of Jesus Christ | 73 | 12 | 07 | 03 | 05 |
| 4. | Christ died to save sinners | 69 | 13 | 13 | 01 | 04 |
| 5. | Existence of the soul | 69 | 14 | 06 | 05 | 06 |
| 6. | Power of prayer | 62 | 18 | 10 | 06 | 04 |
| 7. | Fatherhood of God | 60 | 18 | 13 | 04 | 05 |
| 8. | Forgiveness of sin | 61 | 16 | 12 | 05 | 06 |
| 9. | Reality of sin | 60 | 16 | 13 | 04 | 07 |
| 10. | Immortality | 58 | 16 | 11 | 07 | 08 |
| 11. | Bible is the word of God | 58 | 18 | 10 | 03 | 11 |
| 12. | Genuineness of Christ's miracles | 54 | 19 | 14 | 07 | 06 |
| 13. | Virgin birth of Christ | 57 | 16 | 13 | 05 | 09 |
| 14. | Holy spirit | 54 | 14 | 17 | 07 | 08 |
| 15. | Sunday is an holy day | 54 | 14 | 12 | 06 | 14 |
| 16. | Sacrament of baptism | 41 | 18 | 23 | 06 | 12 |
| 17. | Existence of heaven | 42 | 16 | 17 | 07 | 18 |
| 18. | Man is saved by faith, not by works | 42 | 14 | 17 | 09 | 18 |
| 19. | A day of final judgment | 35 | 16 | 24 | 05 | 20 |
| 20. | Resurrection of the body | 35 | 14 | 23 | 08 | 20 |
| 21. | Existence of hell | 23 | 16 | 21 | 10 | 30 |
| 22. | Present-day miracles | 19 | 14 | 25 | 19 | 23 |
| 23. | Existence of angels | 21 | 15 | 23 | 11 | 30 |
| 24. | Existence of the devil | 20 | 13 | 19 | 11 | 37 |
| 25. | World was created in six solar days | 07 | 08 | 18 | 08 | 59 |

the whole group and in particular denominations which were represented by a fairly large number of students.

If the reader will direct his attention to Table IV, he will find that each of the 305 seniors implicitly believed, on the average, 49 per cent of the propositions submitted, each was inclined to believe 15 per cent, was non-commital on 15 per cent, was inclined to disbelieve 6 per cent and absolutely disbelieved 15 per cent. If we con-

vert these percentages into the number of propositions, we find that each individual, on the average, marked twelve propositions A, four propositions B, four propositions C, one proposition D, and four propositions E. The results for each of the denominations indicated may be read in the same way. Upon further examination it will be observed that the Lutherans had the largest per cent of A's and B's—76 per cent—which means that practically nineteen of the twenty-five propositions were believed. The United Presbyterians have the second

TABLE IV.

*College Seniors*

*Per Cent of Propositions Believed*

| Denomination | No. of Cases | A | B | C | D | E |
|---|---|---|---|---|---|---|
| All denominations | 305 | 49 | 15 | 15 | 06 | 15 |
| Lutheran | 16 | 64 | 12 | 07 | 05 | 12 |
| United Presbyterian | 37 | 56 | 14 | 15 | 04 | 11 |
| Presbyterian | 68 | 56 | 13 | 15 | 05 | 11 |
| Miscellaneous | 36 | 51 | 14 | 16 | 06 | 13 |
| Methodist | 73 | 46 | 18 | 13 | 07 | 16 |
| Congregational | 39 | 41 | 13 | 20 | 08 | 18 |
| No denomination | 15 | 38 | 20 | 14 | 07 | 21 |
| Baptist* | 21 | 38 | 16 | 14 | 12 | 20 |

*Including Seventh Day Baptist.

largest per cent of A's and B's, the Presbyterians third, the miscellaneous group composed of Brethren, Catholic, Christian, Christian Science, Disciples of Christ, Episcopal, Evangelical, Jewish Reformed, Mennonite, Reformed and Universalist fourth, Methodists fifth, those who did not indicate any denomination sixth, Congregationalists seventh, and Baptists including Seventh Day Baptists eighth. Taking the results as a whole, we find that for the whole group 64 per cent or sixteen of the twenty-five propositions were believed. For the denominations the range is from 76 per cent or nineteen propo-

sitions for the Lutherans to 54 per cent or nearly fourteen propositions for the Congregationalists and Baptists. On the other hand, the range of disbelief for the 305 seniors is 21 per cent or only five propositions of the twenty-five. For the denominations the range of disbelief—D's and E's—is from 15 per cent or four propositions in the case of the United Presbyterians to 32 per cent or eight propositions in the case of the Baptists.

What, then, are we to conclude from the results thus far set forth? College seniors implicitly believe or are inclined to believe over three times as many of the twenty-five propositions as they disbelieve. Belief is much greater than disbelief!

Another interesting phase of this study is the responses of the 305 seniors to the particular propositions. In Table III the religious propositions appear in their order of rank as determined by the score, which was determined as indicated above. The numbers which appear at the right of the list of propositions indicate the per cent of the individuals who marked the propositions A, B, C, D or E.

It is very significant, in view of the charge of atheism so often made against college seniors, that the proposition which ranks first and which is believed by 93 per cent of the subjects tested is the "Existence of God." Does this indicate atheism? Other important Christian concepts which rank high are: "Divinity of Jesus Christ" third, "Christ died to save sinners" fourth, "Existence of the soul" fifth, "Power of prayer" sixth, and "Fatherhood of God" seventh. "The ten commandments should be obeyed" ranks second. Through conversation with many seniors it was found that some thought this proposition to be moral rather than religious and thus expressed belief in the "ten commandments" because of their moral rather than religious significance. It is in-

teresting to note that the forgiveness of sin and the reality of sin should be ranked eighth and ninth, being believed by 77 per cent and 76 per cent respectively. The proposition which ranked lowest, being believed by only 15 per cent and disbelieved by 67 per cent, was the "World was created in six solar days;" second lowest, "Existence of the devil," and third lowest, "Existence of angels." Another interesting observation is with regard to the belief in heaven and hell. The existence of hell is believed by 39 per cent and disbelieved by 40 per cent of the seniors; but the existence of heaven is believed by 58 per cent and disbelieved by only 25 per cent. Perhaps, as we noted in the case of the freshmen, the greater belief in heaven is due to the fact that it is usually represented as the fulfillment of the highest hopes and aspirations of an individual. Only in the last five propositions is the disbelief greater than the belief, and even here the difference is significant only in the last two. If the reader will examine carefully Table III, he will discover many interesting relationships which can not be pointed out specifically.

As we noted in the case of the freshmen, so also in the case of the seniors there are some outstanding and interesting denominational differences. The denominational group which manifests the strongest belief, the Lutherans, we shall consider first. All the members of this group implicitly believe or are inclined to believe in the existence of God, and that the "ten commandments" should be obeyed. In this respect their responses are like those of the entire group of 305 seniors. Although they ranked "Divinity of Jesus Christ" eighth, and "Virgin birth of Christ" twelfth, their total belief in these two propositions is the same—81 per cent. In the latter, however, the implicit belief was not quite as great as in the former. "Existence of the soul" which held fifth place in the whole group, was ranked eleventh by the

Lutherans. Although the rank of this proposition is much lower in this denominational group the extent of belief is but slightly less.

Our second denominational group is the United Presbyterian. Here we note that although "Existence of God" is ranked first, as in the whole group, the proposition concerning the "ten commandments" is preceded by "Existence of the soul" and "Christ died to save sinners" which are given second and third places. Another proposition which is placed relatively high in the series—in fifth place—as compared to the entire group is "Bible is the word of God."

The Presbyterians depart from the whole group in that they place more emphasis upon the mission of Christ, divinity of Christ, the power of prayer, fatherhood of God and the existence of the soul than they do upon obedience to the "ten commandments." "The virgin birth of Christ" is ranked rather high by the Presbyterians, being placed ninth and believed by 81 per cent of the group. In other respects their beliefs are very similar to those of all the seniors, including the proposition which they ranked first, "Existence of God," believed by 96 per cent of the Presbyterians.

The miscellaneous group conforms quite well to the entire group of 305 seniors with exception to their belief in "The virgin birth of Christ" and "Bible is the word of God," which they ranked eighth and ninth, in place of thirteenth and eleventh as the whole group did. Both of these propositions are believed by 83 per cent of the seniors included in the miscellaneous group.

The beliefs of the Methodists and Congregationalists resemble those of the entire group so closely that none stands out as being particularly distinctive. In the case of the "no denomination" group the mission of Christ is placed lower than usual (tenth place) and is believed by only 60 per cent of the individuals. On the other hand, they ranked "Bible is the word of God" fifth, as the

United Presbyterians did, which proposition is usually ranked much lower than that.

For the Baptists, we note a number of interesting departures from the usual. They ranked the proposition dealing with the reality of sin second which is unusually high for this proposition. "Fatherhood of God" was ranked somewhat lower, where as belief in the holy spirit was somewhat greater than among most of the other groups. "Sunday is an holy day" was ranked twenty-fourth and believed by only 24 per cent and disbelieved by 66 per cent. This is due to the fact that a rather large percentage of this group were Seventh Day Baptists.

All of the denominations ranked the existence of God first except the Methodists, who ranked it second. For the proposition ranked second by the whole group—"Ten commandments should be obeyed"—we do not find such extensive agreement. One denomination, Methodist, ranked this proposition first; four groups, Lutherans, miscellaneous group, Congregationalists and "no denomination" group, ranked it second; the United Presbyterians gave it fourth place; Baptists fifth, and Presbyterians seventh. Although each of the denominational groups ranked the proposition, "World was created in six solar days" twenty-fifth, there is considerable difference in the extent of their belief and disbelief (of the Lutherans 30 per cent believed, Baptists 23 per cent, miscellaneous group 22 per cent, "no denomination" 20 per cent, Methodists 18 per cent, Presbyterians 10 per cent, Congregationalists 8 per cent, and United Presbyterians 8 per cent). The United Presbyterians also had the largest percentage of disbelief—81 per cent. It is certainly interesting to note that even after four years of college instruction there should still be so many who believe that the world was created in six *solar* days. Either this childish notion has been so permanently ingrained that knowledge of the sciences will not efface

it, or else college instruction is not as penetrating and effective as we think it is.

Briefly let us compare the freshmen with the seniors. When we compare Tables I and III, we see that the freshmen have a greater inclination to believe the twenty-five religious propositions than have the seniors. The range of belief for the freshmen extends from 96 to 53 per cent, and that for the seniors from 93 to 15 per cent. If we make a more detailed examination of the two groups we find that seven of the twenty-five propositions were given exactly the same ratings by both groups. The propositions are: "Power of prayer," "Genuineness of Christ's miracles," "Holy spirit," "Sacrament of baptism," "Man is saved by faith, not by works," "A day of final judgment" and "Resurrection of the body." In every case, however, we note that the seniors do not believe these propositions to the same extent that the freshmen do. Another significant observation is that the freshmen place obedience to the "ten commandments" first and the existence of God second, whereas the seniors invert this order. Of the freshmen, 96 per cent, and of the seniors 93 per cent, believe in the existence of God.

Now let us direct our attention to the last proposition of each series. The freshmen ranked "Present-day miracles" lowest with a belief of 53 and a disbelief of 29 per cent. The seniors ranked this same proposition twenty-second but with a belief of 33 and a disbelief of 42 per cent. The seniors placed "The world was created in six solar days" at the foot of their list with a belief of 15 per cent and a disbelief of 67 per cent. The freshmen placed this item next to the last and manifested a much greater belief—53 per cent and a disbelief of 28 per cent.

Various similarities may be noted between the beliefs of the freshmen and the seniors as: both groups of students are more inclined to believe in the forgiveness of

sin than in its reality; more are inclined to believe in the existence of heaven than in the existence of hell; in the existence of angels than in the existence of the devil; in immortality than in a day of final judgment. Of each of these pairs, the one element which is believed in the more, tends to suggest pleasantness whereas the other element is to be avoided. The mercy of forgiveness is something to be sought but the stern reality of sin is uninviting. Heaven suggests golden streets and pearly gates but hell suggests Dante's *Inferno*. Angels are aesthetic beings but the devil is an odious monster. The thought of immortality is refreshing but that of judgment depressing.

We have seen that college freshmen and college seniors believe essentially the same religious propositions and that they do have religious beliefs.

# THE PHOTOGRAPHIC EYE-MOVEMENT RECORDS OF SUCCESSFUL AND UNSUCCESSFUL COLLEGE STUDENTS

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Each year a relatively large proportion of college students fail. At the University of Minnesota approximately one-third of the freshmen discontinue their college work by the end of the first year. One-half turn elsewhere by the end of the second year. Among the reasons for this high mortality rate, lack of ability stands paramount. Yet, to say that a student has failed because he lacks ability is no more elucidating than to say he has failed. To ascribe lack of ability as a cause of failure requires that the term "ability" be defined. Does it imply general intelligence as measured by the usual college ability test? If so, for any single student who has failed, one of corresponding ability may be found who has succeeded. Since this is a demonstrable fact it must be said that the second student has the ability to succeed in college even though his score on the intelligence test is low. If such tests measure ability then by inference the first student must possess the requisite amount for success. While in the face of available evidence no one can gainsay that a much larger proportion of students with low than with high scores on such tests fail, the data do not warrant a deduction that ability as measured is the only reason for failure. Undoubtedly it is a contributing factor but with compensating traits a student who obtains low scores on these tests is able to succeed.

Likewise, it is no more enlightening to say that a student fails in college because he failed in high school. Certain students may be found, although infrequently, who have relatively unsuccessful high school records and yet achieve remarkably well in college. At the present time no single cause may be isolated to account for all college failures. The causes are probably individual and varied. If group characteristics of failing students can be identified they will at least afford a basis for conducting more intensive studies of individuals. For this purpose a series of investigations has been inaugurated at the University of Minnesota. Among these is the present study of the photographic eye-movement records of successful and unsuccessful college students.

The group of college failures included 49 probation students in the College of Education, 17 of whom were freshmen; 16, sophomores; 10, juniors; 2, seniors; and 4, unclassed. The probationary status indicates that these individuals had received unsatisfactory marks in fifty per cent or more of the credit hours for which they were registered. For comparative purposes each probationer was matched with a fellow classman on the bases of sex, major subject, and scores on the Miller Hard Analogies Test. The chief distinguishing feature of the mate was the successful scholarship record evinced by the fact that he was not on probation.

At the time the data for this study were being collected the members of the unsuccessful group were required to attend a special study class for three fifty-minute periods each week. Throughout the quarter a number of tests were administered. Previous records were available for both groups, giving the scores on the Minnesota Reading Examination for College Students and the Miller Hard Analogies Test. Since the analogies test was used for matching, comparisons were available on the Minnesota Reading Examination and the Minnesota Speed of Reading Test. In addition the marks dur-

ing the three quarters of the year 1930-31 served as contrasting data.

While such comparisons are of considerable importance the chief concern of the present investigation is a contrast of the photographic eye-movement records of probation and non-probation students. The records were obtained with a camera recently constructed at the University of Minnesota. The apparatus involves a modification of the technique developed by Dodge. A beam of light emanating from a carbon arc lamp is reflected into the subject's eye through the use of a small mirror attached to the apparatus. The cornea, acting as a second reflector, directs the light into a camera so that it may be focused upon kinetoscopic film. While the record is being taken this film moves at a uniform rate. Since the angle of the beam of light alters with each eye-movement the record yields an account of each fixation and forward or regressive movement. To secure the duration of each pause the beam of light is broken by a perforated disk revolving at a constant rate. The disk used in this study interrupted the light fifty times per second. The photographic records, therefore, consisted of a series of dots, each of which represented one fiftieth of a second. With such records it was possible to secure for each paragraph read: (1) the number of fixations, (2) the number of regressions, (3) the duration of fixational pauses, and (4) the duration of regressional pauses. Each student read two paragraphs in succession. These records provided the major comparative data of the study.

The summary of test and scholarship records arranged in Table I furnishes an initial comparison of the two groups. Any student on probation in the College of Education sometime during the year 1930-31 for whom a mate with eye-movement records could be secured was included in the group of unsuccessful students. Since the Miller Analogies Test was among the bases for match-

TABLE I

*The Reading Test and Scholarship Records of Probation and Non-Probation Students.*

| Measure | Probation Group | | | | Matched Group | | | | Differences | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | M | $P.E._M$ | S.D. | N | M | $P.E._M$ | S.D. | D | $P.E._D$ | $D/PE_D$ |
| Miller Analogies | 49 | 18.93 | 1.66 | 17.20 | 49 | 19.64 | 1.55 | 16.04 | .71 | 2.27 | .31 |
| Minn. Reading | 49 | 22.60 | 1.80 | 18.67 | 49 | 28.75 | 2.40 | 24.64 | 6.15 | 3.00 | 2.05 |
| Minn. Speed of Reading—Form A | 39 | 17.21 | .74 | 6.86 | 39 | 16.72 | .59 | 4.70 | .49 | .95 | .52 |
| Minn. Speed of Reading—Form B | 29 | 17.62 | 1.08 | 8.64 | 29 | 18.16 | 1.07 | 6.94 | .54 | 1.52 | .36 |
| Fall Quarter 1930 H.P.R.s | 46 | .15 | .05 | .45 | 46 | 1.15 | .05 | .52 | 1.00 | .07 | 14.14 |
| Winter Quarter 1931 H.P.R.s | 47 | .51 | .05 | .53 | 47 | 1.13 | .05 | .52 | .62 | .07 | 8.77 |
| Spring Quarter 1931 H.P.R.s | 42 | .63 | .07 | .63 | 42 | 1.22 | .06 | .60 | .59 | .09 | 6.40 |

ing no significant difference would be anticipated between the mean scores of the groups. The average percentile rank of the probation students was 18.93 and of the matched group, 19.64. The difference of .71 between these means is negligible. It is readily observed that the groups rank low on the intelligence test for the averages are slightly below the twentieth percentile. For a random selection the mean percentile rank should be fifty.

Similarly the mean percentile ranks on the Minnesota Reading Examination are low. The non-probation students, however, have the higher average. The difference between the two groups is 2.05 times its probable error. While this difference cannot be described as significant the tendency is in the same direction as that of more significant differences reported elsewhere.[1] The accumulated evidence indicates a decided trend for the successful students to obtain higher scores on the reading comprehension test. The same tendency is not apparent for rate of reading. On Form A of the Minnesota Speed of Reading Test the average raw score of the probation students is slightly higher than for the matched group. The difference is in the opposite direction on Form B. In neither case is the difference as large as its probable error.

The disparity between the average scholarship ratings is decidedly more marked. At the end of the fall quarter, 1930, the average honor point ratio[2] of the probation group was .15, which in terms of letter grades is slightly above a D. The average ratio for the matched group

[1] A. C. Eurich. "Improvement in Scholarship During the Probationary Period." *School and Society*, 35:129-134, 1932.

[2] This ratio was obtained by dividing the total number of honor points earned by the total number of credits for which the student was enrolled. The honor points were assigned as follows: 3 for each credit of A, 2 for B, and 1 for C. One honor point was subtracted for each credit hour with a mark of F.

(1.15) is exactly one grade point higher than for the probation students. The difference is more than fourteen times its probable error and is, therefore, distinctly significant. Since the average marks of the probationers are higher during the winter and spring quarters it is clear that their scholarship has improved. At the end of the spring quarter, however, the difference in means remains more than six times its probable error. Throughout the year the non-probation students have maintained a scholarship average above the grade of C whereas the probation students continue significantly below this level.

The data derived from the photographic eye-movement records are summarized in Table II. Since the major portion of reading time is consumed by fixations the duration of the eye-movements has not been taken into consideration. The term "fixational pauses" as used in the table refers to any fixation regardless of whether it occurs after a regressive or forward movement. The duration of these fixations is expressed in units of 1/50 second. The time spent on fixational pauses is in reality the total perception time for reading a paragraph since it has been shown that visual impressions are usually absent during the period of saccadic eye movements. With this brief explanation Table II may be read as follows: The average duration of fixational pauses for 49 probation students who read paragraph I is 632.15 fiftieths of a second or approximately 13 seconds. The probable error of the mean is 14.54 while the standard deviation of the distribution is 150.85. For the matched group the average time spent on fixational pauses is 584.19±13.01. The standard deviation is 135.05. The difference between these means of 47.96 is 2.46 times its probable error. A definite tendency is hereby shown for the probation students to consume a longer period in perceiving the reading matter than do the successful students who have corresponding scores on the intelli-

## TABLE II

*The Eye-Movement Records of Probation and Non-Probation Students.*

| Measure | Probation Group | | | | Matched Group | | | | Differences | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | M | P.E.$_M$ | S.D. | N | M | P.E.$_M$ | S.D. | D | P.E.$_D$ | D/PE$_D$ |
| **Paragraph I** | | | | | | | | | | | |
| Fixational Pauses | | | | | | | | | | | |
| Duration | 49 | 632.15 | 14.54 | 150.85 | 49 | 584.19 | 13.01 | 135.05 | 47.96 | 19.51 | 2.46 |
| Number | 49 | 50.31 | .90 | 9.29 | 49 | 51.45 | .95 | 9.83 | 1.14 | 1.31 | .87 |
| Regressions only | | | | | | | | | | | |
| Duration | 49 | 69.64 | 4.74 | 49.14 | 49 | 58.62 | 3.62 | 37.61 | 11.02 | 5.96 | 1.85 |
| Number | 49 | 6.17 | .39 | 4.10 | 49 | 5.95 | .37 | 3.84 | .22 | .41 | .54 |
| **Paragraph II** | | | | | | | | | | | |
| Fixational Pauses | | | | | | | | | | | |
| Duration | 49 | 605.61 | 13.45 | 139.55 | 49 | 564.80 | 12.27 | 127.35 | 40.81 | 18.21 | 2.24 |
| Number | 49 | 48.10 | .84 | 8.76 | 49 | 50.80 | .89 | 9.20 | 2.70 | 1.22 | 2.21 |
| Regressions Only | | | | | | | | | | | |
| Duration | 49 | 61.68 | 3.76 | 39.02 | 49 | 45.77 | 3.08 | 31.94 | 15.91 | 4.86 | 3.27 |
| Number | 49 | 5.62 | .29 | 3.04 | 49 | 4.85 | .30 | 3.07 | .77 | .42 | 1.83 |
| **Paragraphs I and II** | | | | | | | | | | | |
| Fixational Pauses | | | | | | | | | | | |
| Duration | 49 | 1237.25 | 26.15 | 271.35 | 49 | 1146.43 | 24.02 | 249.30 | 90.82 | 35.51 | 2.56 |
| Number | 49 | 97.70 | 1.61 | 16.72 | 49 | 101.48 | 1.70 | 17.64 | 3.78 | 2.34 | 1.62 |
| Regressions Only | | | | | | | | | | | |
| Duration | 49 | 131.17 | 7.54 | 78.24 | 49 | 102.40 | 5.78 | 59.96 | 28.77 | 9.50 | 3.03 |
| Number | 49 | 11.30 | .62 | 6.41 | 49 | 10.30 | .60 | 6.18 | 1.00 | .86 | 1.16 |

gence test. This trend agrees with that observed on the Minnesota Reading Examination for College Students even though the two measures are not tests of the same ability. The correlations between the reading test and the duration of fixational pauses have been observed to vary from .04 to .13 for different groups. From correlations as low as these it would be extremely difficult to argue that the agreement of the data from two methods of comparison is due to the fact that the same aspect of reading ability is being measured. Furthermore the low correlation cannot be ascribed to the unreliability of the measures, as the coefficient of reliability for the reading examination is .87 while for the records of perception time it is .91. With reliability coefficients of this magnitude the intercorrelations would not be much higher even though they were corrected for attenuation.

It appears, then, that on two independent measures of reading ability the successful college students obtain higher ratings. Since the correlations between perception time and college marks were found to be extremely low (−.20 to .03) for a group of 173 students including the 98 in the matched group, it is difficult to attach much significance to the trend on the duration of fixational pauses unless reliable differences can be obtained.

Although the difference between the two groups on the total number of fixational pauses is in the opposite direction from that observed above, it is less than its probable error and is not, therefore, significant. The average number of fixations for the probation group is 50.31. In terms of averages, then, each fixation is approximately one-fourth of a second in duration. The mean fixational pauses for the matched group is 51.45. The difference is only .87 times its probable error.

An analysis of the regressions indicates that the average duration of the pauses following regressive eye-movements is 69.64 units, or slightly more than one

second for the probation students. For the matched group, the average is 58.62. The difference is in the same direction as that for the fixational pauses but not so significant. In terms of the number of regressions the mean for the unsuccessful students is 6.17 and for the successful, 5.95. The difference of .22 is wholly accountable for by chance fluctuation.

The trend for paragraph II and I and II combined is practically identical to that observed for the first paragraph, the chief point of variance being that the differences are slightly more significant. In view of the apparent tendency, reading efficiency seems to be an important factor contributing to the successful endeavor of the students in the matched group. In spite of the fact that these students rank low on the intelligence test, they have achieved at the college level. The failure of the probation students cannot, therefore, be attributed wholly to the low ratings on the intelligence test. Although the differences that have been found on the reading comprehension test and in perception time are not unquestionably significant the trend is so consistent that an inference seems warranted to the effect that reading ability apart from intelligence contributes to the success of students at the college level.

## SUMMARY

1. When probation students are matched with successful college students on the bases of sex, major subject, and score on an intelligence test, the successful students tend to obtain higher scores in reading comprehension. (Minnesota Reading Examination for College Students.)

2. No significant differences between the two groups in rate of reading as measured by the Minnesota Speed of Reading Test are revealed.

3. The students in the matched group spend slightly less time in fixational pauses while reading than do the probation students.

4. While the average number of fixational pauses is greater for the successful than for the unsuccessful students, the trend is not significant.

5. The duration and number of regressional fixations are slightly greater for the probation students.

# AN EXPERIMENT WITH THE NUMBER MAZE AS A MEASURE OF LEARNING

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The object of the investigation was to determine whether or not learning resulted from repeated solutions of a number maze. The study was undertaken in the spring semester of 1931-32, at the San Diego State Teachers College. The subject group included thirty-two upper division students enrolled in a course of educational psychology.

The number maze as used in the experiment consists of a group of numbers having an arbitrarily assigned range of values, placed at random order in the form of a square. The sum of any series of numbers connected by a continuous line is referred to as a maze total. High or low maze totals are dependent upon the choice of number combinations. Figure 1 is an illustration of the number maze, showing two series of combinations representative of a high and low maze total.

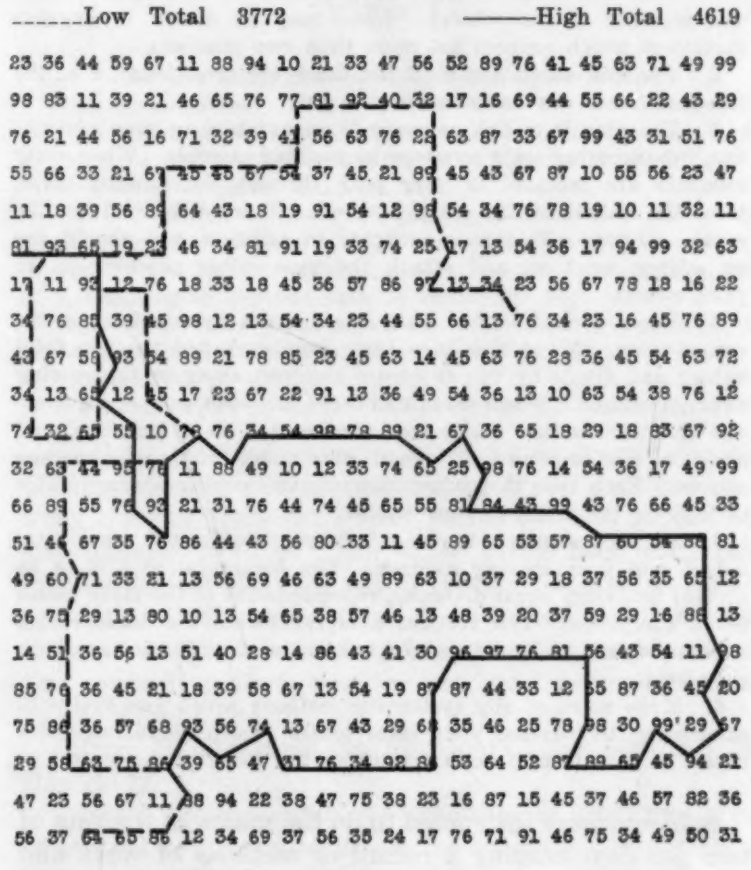
Mazes, such as the finger maze, the stylus maze, and the double alternative maze, require of the subject the achievement of some definite goal as an indication of learning. The number maze provides for the measurement of improvement in terms of increase in maze total, a variable factor offering the possibilities of a finer and more extended measure of increase in the function or functions exercised.

[1] The writer is indebted to Dr. M. E. Broom of San Diego State Teachers College for the collection of the data.

Each student was given sixty number maze sheets, and a sheet of directions covering the procedure to be followed. The specific directions given were as listed.

FIGURE 1

*The Number Maze, Showing Two Series of Number Combinations*




Total (for 60 numbers)_____

Your name_____ Your maze number_____

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Directions for doing the number maze and for recording your results.

1. In doing this maze, you are to draw a continuous line connecting sixty numbers. In drawing horizontal and vertical segments of this continuous line, not less than three numbers and not more than five numbers must be connected by a continuous line (or segment of the whole). Lines may be drawn in angular directions which connect not more than two numbers.

2. The continuous line must not touch nor cross itself, *i. e.*, the line may touch any one number once only.

3. The plan is to link as many large numbers in your continuous line including sixty numbers as you find possible. When sixty numbers are included in your path through the number maze, total the values of the sixty numbers. Place this total on the maze. (NOTE: To insure accuracy in addition, you should use an adding machine, and attach the tape, after checking it, to your maze.)

4. Enter the total for each single maze by number on the record sheet. When five have been completed, add the five total values and divide by five to secure the first entry in the moving average column. When maze number 6 has been completed, average the total values for mazes numbered 2 to 6 inclusive, and divide by five, to secure the second entry under the moving average column. Each time thereafter, compute the moving average value to indicate the trend of your results.

5. Prepare a graph showing both your individual maze total values and your moving average. The horizontal axis is to be divided into sixty equal divisions, representative of the sixty mazes to be completed. The vertical axis represents the maze values (scaling values to be determined later after five mazes have been completed).

6. Make notes of any systematic methods which you evolve in attempting to increase your maze totals. Keep an introspective report of your mental reactions during the doing of the mazes.

Subjects were instructed to do the mazes at the rate of two per day, keeping a record of methods of work and mental processes employed. Each subject was instructed to do all arithmetical computations with calculating machines in order to minimize errors in addition. At the

end of the thirty day period, the graphs and introspective reports were collected.

An examination of the reports show a number of different devices were employed by the thirty-two students. These devices are listed in Table I.

TABLE I

*Devices Employed in Doing the Number Maze*

| Number | Devices | Frequency |
|---|---|---|
| 1. | No method, at random | 8 |
| 2. | Selecting a general path and trying to improve by checking possible alternatives | 2 |
| 3. | Circling all high numbers and joining as many as possible | 5 |
| 4. | Selecting combinations of high average and trying to connect by the highest path | 6 |
| 5. | Attempting to improve path by connecting high score portions of previous paths | 4 |
| 6. | Locating high areas and trying to connect highest number combinations so situated | 3 |
| 7. | No statement as to specific devices employed | 4 |

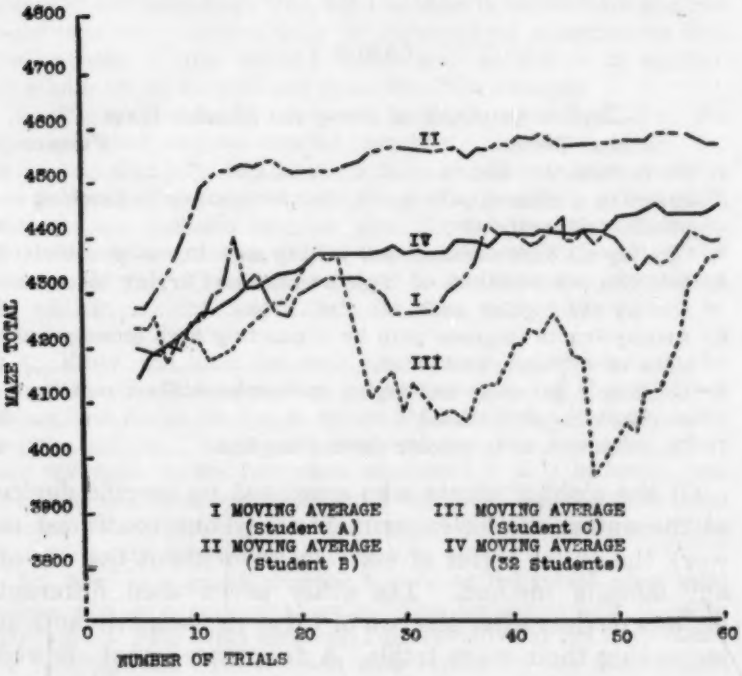
Of the eight students who employed no specific device at the outset of the experiment, only one continued to work the entire series of sixty mazes without the use of any definite method. The other seven used different definite devices after the two or three random attempts at increasing their maze totals. A frequency count showed that the method of selecting high number combinations and connecting them was the one most commonly used by the subject group.

Figure 2 illustrates learning curves as obtained in this study.

Curve I is representative of the type of learning curve submitted by the majority of the subjects. It portrays a fluctuating but steadily increasing maze total. Curves II and III are examples of exceptions to the previous statement. II illustrates a practice curve which shows a high initial increase in score values, maintained there-

FIGURE 2

*Curves of Learning Showing Increase in Maze Total, Resulting from Repeated Solutions of a Number Maze. The Curves Show Moving Averages for Three Students and for the Group of Thirty-two Students. Each Average is for Five Maze Totals*




after without any material increase or decrease. The method employed was that of connecting high score portions of previous paths. Curve III shows no significant increase or decrease in the maze total. It was submitted by a subject who evinced no interest in the nature of the experiment and who continued to work the entire series of mazes in a random fashion. Curve IV, which is obtained by combining the maze totals of each of the sixty mazes worked by the thirty-two students, and averaging, shows a definite upward trend. The curve agrees,

in all essentials, with those found in other studies on the subject of practice as a means of improvement in learning.[2]

It is impossible to state in this report whether the method of selecting high number combinations, previously referred to as being the most frequently used, was the most successful. In all thirty-two cases attainment of a high score varied from subject to subject even when the same system of work was employed. It is probable that success with any particular method is greatly influenced by the degree of interest in the experiment, the conditions of work, the length of time spent in choosing proper number combinations, and the general intelligence of the student.

We may conclude that learning seems to result from the use of the number maze as a practice instrument, since the curve resulting from the use of the practice maze is a typical form of learning curve. The number maze offers possibilities for the study of learning. Data as obtained in the present study are insufficient for the formulation of any definite statement as to the amount of learning involved, but seem to warrant the repetition of the experiment, using a more refined technique. It would be well to take the following factors into consideration upon further experimentation with the number maze as a measure of learning.

1. The intelligence of each individual student should be taken into account.
2. The need for the use of arithmetical ability should be eliminated as much as possible.
3. The environment of the subject, or subjects, should be kept as constant a factor as possible.
4. A definite maximum time limit should be set for the working of any single maze so as to give a more

[2] Sandiford, Peter, *Educational Psychology*. London: Longmans, Green and Company, 1929, Chap. XI, pp. 207-35.

adequate measure of the relative amount of improvement in learning of each subject in terms of the group.

5. Mazes should be collected at periodic intervals to lessen the effect of memorization through repeated inspection of completed mazes, or of copying paths on subsequent mazes.

# AN EXPERIMENTAL COMPARISON OF THE NEW TYPE TEST AND THE TERM PAPER

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There are probably no devices of instruction at the secondary and college levels more commonly used than the term paper or written exposition of a large unit of subject matter and the new type examination. The advocates of the new type examination may argue that a mere written presentation of a topic however well organized and comprehensive can never develop the accurate mastery of important factual materials as well as the new type examination, while the advocates of the written paper may aver that the new type and even the essay type examination place too great emphasis on a superficial memory of details with no exercise of organizing and creative abilities.

It is the purpose of this report to present experimental evidence which will throw some light on the respective values of these two devices. The task was to discover the extent to which the paper achieves the same results as the new type examination at the same time preserving the values theoretically assumed to be derived from the written exposition. Stated in terms of the procedure of this experiment the problem was to determine to what extent one group of college students writing a paper covering the first half of a course is able without previous notice to pass a new type examination over the same part of the course as compared with an equivalent group in the same course taking the same examination.

The two classes employed in the experiment were composed entirely of juniors and seniors in a course in educational psychology at the University of Michigan. Forty-two students were in the experimental section, while thirty-eight were in the control section. Both groups up to the time of the examination had covered the same content under the instruction of the writer and had access to the same texts and supplementary reading materials. Three weeks before the date of the examination both groups received the same outline over the first half of the course. The experimental section was requested to prepare a paper using the outline only as the minimum subject matter to be included in the presentation. The members of this section, however, were advised to supplement the outline with added content and were encouraged to exercise originality in style, organization, illustration, and application.

The control section was instructed merely to prepare for a mid-term examination of the objective type using the outline as a guide for their study. The same date was announced for the culmination of the work of both groups. For the control group it was a date for taking the examination, but for the experimental group it was a date for turning in the paper. It is an important element of the procedure that the experimental (or paper writing) group did not expect to take an examination. It was explicitly suggested that while the other section was taking a test on the same date, this requirement would not apply to the experimental group, for the paper was to be a substitute for the test. However, on the day when the papers were due, the experimental (paper writing) group was requested to take the same examination which the control group was to take during the next class period. The reaction of surprise and indignation was authentic evidence that the experimental group had not expected to take the examination. After the experiment was completed the instructor restored confidence

in the paper writing group by explaining the experimental purpose of this apparent deception.

At the conclusion of the examination period the experimental group was asked to write down the amount of time required to write the paper, and the control group was requested to indicate the amount of time employed in studying for the test.

The test papers were not scored in class but were collected and retained by the instructor. Ten days later the same test was given again to both sections without notice in order to determine the amount of material retained by both groups.

Both groups had already taken the Cook-Chapman reading test with a reduced time limit (two minutes) and the Army Alpha intelligence test. These measures were employed to determine the equivalence of the experimental and control groups in speed of reading and intelligence. The results of the first and second administrations of the mid-term new type examination, the intelligence and reading test scores and the time records for both groups are presented in the following table:

TABLE I

*Comparative Results of the Paper Writing and Control Groups in Two Administrations of a New Type Examination*

| Groups | Number in Group | Intelligence | Reading | First Test | Second Test | Time in Hours |
|---|---|---|---|---|---|---|
| Paper writing | 42 | 157 | 22.9 | 31.3 | 33.1 | 10.9 |
| Control | 38 | 153 | 22.7 | 32.5 | 32.3 | 5.8 |

The preceding table of averages indicates a very slight advantage for the experimental group over the control group in intelligence, virtually no difference in reading, a slight but insignificant disadvantage in the first test and a slight but insignificant advantage in the second test. The experimental group, however, did require much more time to write the paper than the control group

employed to prepare for the examination. In general then these data indicate that as far as performance in taking a new type examination over the first half of a university course in educational psychology is concerned neither device, *i. e.*, writing a paper without any thought of an examination, or specific preparation for the same examination, seems to have any advantage over the other. But much more time is consumed in writing the paper than in the customary direct preparation for the examination.

After the foregoing tabulations were examined, a further type of analysis was undertaken to determine the amount of agreement between the subject matter actually included in the papers of the members of the experimental group and their performance on the examination. This analysis consisted of an itemized comparison of the responses made by each individual student on the examination blank and the points which he included in his paper. To be specific the paper of each student was checked for each separate question of the examination for the purpose of determining how much of the examination was omitted or anticipated (either correctly or incorrectly) in the paper. For example, the following table indicates that in the first test an average of 11.7 points was answered correctly in the test and the same 11.7 points were stated correctly in the papers; 3.1 points were wrong in the test and right in the paper; .6 of a point was right in the test and wrong in the paper, etc.

TABLE II

*The Number of Examination Questions Omitted or Anticipated in the Papers of the Experimental Group*

| | Rt. Exam. Rt. Paper | Wrg. Exam. Rt. Paper | Rt. Exam. Wrg. Paper | Wrg. Exam. Wrg. Paper | Rt. Exam. Omit Paper | Wrg. Exam. Omit Paper |
|---|---|---|---|---|---|---|
| First Exam. | 11.7 | 3.1 | .6 | .4 | 17.7 | 9.6 |
| Second Exam. | 11.1 | 1.3 | 2.6 | .35 | 18.4 | 9.1 |

Three important results stand out in the data of the above table. First, the written papers correctly anticipated a considerable portion of the content of the examination, 11.7 and 11.1 points for the first and second test respectively. Second, a smaller but important number of points were omitted from the papers and were answered incorrectly in the tests, 9.6 and 9.1 for the first and second tests respectively. The third and most significant result is that a much greater number of points were not explicitly anticipated (*i. e.*, omitted), 17.7 for the first and 18.4 for the second, but were correctly answered in the test, which indicates the important amount of incidental learning acquired in the composition of a paper.

Three general interpretations may be drawn from the results of this investigation as contained in the data of Tables I and II. First, it makes no difference as far as the mastery of factual material is concerned whether a student prepares directly for an examination or whether he writes a paper elaborating a certain minimum content on which the examination is based. Second, writing a paper is an extravagant device since the same factual material is obtained by direct preparation in about half the time required by the composition of a paper. Third, writing a paper is far superior to the customary direct preparation for an examination because without involving the disadvantages of direct preparation the paper achieves the same factual material and carries with it an opportunity for the exercise of the higher processes of organization and creative expression.

The writer wishes to support the last interpretation in the following argument. The new type examination is undoubtedly an important contribution to the science of education. It is economical because of its comprehensive scope; it is convenient because of its ease of scoring, and it is scientific because of its objectivity. But its very comprehensiveness fosters facility in a superficial type

of memory, and its convenience and objectivity place exaggerated emphasis upon the acquisition of isolated and, too frequently, trivial pieces of information. Furthermore, it affords no chance to put old materials together in new patterns expressive of the creative purpose and insight of the individual.

When one surveys the dominant rôle being played by the comprehensive examination in current revisions of educational procedure and when one notes the increasing adoption of the new type test as the central feature of the comprehensive examination, the limitations of the new type test become a very serious matter in the formulation of educational policy. There is a wide gap in educational practice between the objectives which we announce and the objectives which we measure. After the smoke of college catalogues, theoretical articles in professional journals, and speeches on educational philosophy before national meetings has cleared away, there still remains the cold evidence of mere fact-regurgitation as the objective actually embodied in the general run of new-type examinations. After all, examinations will always be more significant not as devices of measurement, but as definite statements of explicit objectives. As long as educators profess one goal and actually measure another they can never escape the essential hypocrisy of this discrepancy. In a word, then, it can be said that users of the new type test have greatly emphasized (and to advantage, let it be said in all fairness) the factor of reliability, but they have in practice virtually ignored the vastly more important factor of validity. We may repeatedly count the grains of sand in a sand pile and on ten different occasions get the same total, but what of it?

Now the significance of the outcome of this investigation is that the writing of a paper, while avoiding the evils described in the preceding paragraph, achieves as important a mastery of factual material as is achieved

by direct preparation for the new type examination. This latter point is especially significant in the light of the large amount of incidental acquisition of facts which the experimental group exhibited. Furthermore, the facts in the papers were organized into a functional relationship. Obviously the mere writing of a paper does not inevitably elicit creative and profound sequences of ideas on the part of the writer, but facts and ideas certainly enter more completely into the possession of an individual if he must restate them in his own patterns in elaboration of a central theme. Furthermore, under the guidance of a stimulating instructor or in the hands of a superior student the paper may become the vehicle for the exercise of some of the highest functions which the educative process is supposed to develop. As usual, the middle of the road is the sensible approach to the issue raised by this discussion. The new type test examination and the paper both have distinctive values as educational instructional techniques. But if there had to be a choice, the writer interprets the data of this investigation as indicating the superiority of the written exposition.

## NEWS AND NOTES

The Journal wishes to correct an error which occurred in the June, 1933, issue (p. 334). In the review of Taussig and Joslyn's book entitled *American Business Leaders* the reviewer's name was inadvertently omitted. The review was by Dr. Harold E. Burtt, Ohio State University.

Ever since the article entitled "Table of Standard Errors and Probable Errors of Percentages for Varying Numbers of Cases" by Harold A. Edgerton and Donald G. Paterson was published in this Journal in 1926 there has been a demand for reprints. We would call the attention of the readers to the fact that we have had reprints made of this Table which can be obtained at the following rates: 30 cents for single copies; 20 cents each for orders of 5 to 24; 15 cents each for all orders of 25 or over. These may be secured from James P. Porter, Editor, Ohio University, Athens, Ohio.

The attention of our readers is again called to the article in the October, 1932, issue of this Journal by Dr. Harriet Babcock entitled "The Short Army Performance Scale in Clinical Practice." It is our belief that Miss Babcock's article will prove very useful to members of the staffs of psychological clinics. Inquiry concerning reprints may be addressed to the author, 25 Prospect Place, New York City, or to this Journal.

Dr. A. A. Roback, editor of Morton Prince's *Clinical and Experimental Studies in Personality*, which has been out of print for some time, has brought out a second edition of this work together with a brief memoir of the author. The edition is limited to 400 copies and the type has been distributed. The volume sells for $5 and may be ordered direct from the Sci-Art Publishers, Harvard Square, Cambridge, Mass.

According to a recent announcement by Harry L. Hopkins, Federal Emergency Relief Administrator, many needy, unemployed teachers are being assigned to teach in rural schools that have been closed or drastically curtailed. Some of the teachers will be assigned in cities as well as in rural communities to teach adults who cannot read and write English. Thirty-three states have

reported through their education officials that approximately 80,000 teachers are unemployed. Some 15 states have definitely reported shortened school terms. "While it is most emphatically not the intention of the Federal Emergency Relief Administration to subsidize the school system in any community or to relieve school officials of their responsibility," stated Mr. Hopkins, "I believe that the expenditure of work-relief funds in the interests of destitute teachers will result indirectly in great community benefit."

Stanford University Press announces the publication of a Vocational Interest Blank for use with women, by Dr. Edward K. Strong, Jr. The blank, consisting of 410 items, of which 260 are common to both men's and women's blanks, are priced at $2.00 for 25 blanks. Announcement is also made of the preparation of new scoring scales for musician, artist, carpenter and policeman.

Norman Powell, Psychologist at the Classification Clinic, Sing Sing Prison, has withdrawn from the editorship of *The Psychological Exchange*.

In a conference called by Dr. George F. Zook, United States Commissioner of Education, on October 30, a plan was outlined for teaching motion picture appreciation to boys and girls. Representative high schools in several states will be selected to use Dr. Edgar Dale's book, *How to Appreciate Motion Pictures*, as a text in the planned experiment. Dr. W. W. Charters, Bureau of Educational Research, Ohio State University, indicated in his report of the Payne Fund motion picture research studies that motion pictures are a very powerful educational influence both for good and evil.

Eighteen states now have cooperative testing programs for their high school pupils, as pointed out by Dr. David Segel, specialist in tests and measurements, in a new Office of Education Bulletin No. 9. In addition to the state cooperative testing services there are six national testing programs. One of these, the College Board Entrance Examination, gave examinations to 19,929 high school pupils in 1932. Among the chief reasons for cooperative testing are, first, determining admittance to college; some examinations emphasize the application of principles rather than the memorizing of specific facts, thus freeing the teacher from too great dependence upon the textbook; also records of the growth of an individual over a period of time furnishes a better means of predicting success in school. Cooperative tests aid in the supervision of high schools by state authorities, as well as furnishing valuable data for research problems.

## BOOK REVIEWS

MURCHISON, CARL, Editor. *A Handbook of Child Psychology.* Second edition, revised. Worcester, Mass., Clark University Press. 1933 xii + 956 pp. $5.00.

The *Handbuch* is a German institution carried, in some instances, to illogical lengths; witness Abderhalden's *Handbuch der biologischen Methoden* bound in 43 large volumes! Hardly a work one would feel comfortable with in one's hands. But regardless of size they serve a very useful function in presenting, for their date, authoritative summaries of special fields. Dr. Murchison is to be congratulated for successfully undertaking the publication of similar works in this country. Those published under his editorship, while not so large as most of the German ones, are equally valuable.

The volume at present under discussion is a revision, after slightly more than two years, of the *Handbook of Child Psychology.* Revision is a modest term—the book is really a new work. While there are only 24 papers as compared with 22 in the first edition, there is about 45 per cent more type-page area. The present volume is arranged in a much more satisfactory manner than the earlier one with five logically succeeding parts: methods, pre-natal development, post-natal development, factors modifying behavior, and studies of special groups.

To attempt even a brief description of the 24 papers would extend this review to a length much greater than the space at my disposal. As the earlier volume is widely known a contrast with it will indicate the value of the new edition.

Eleven of the papers are on topics not considered in the first edition. Leonard Carmichael has an excellent and complete survey of the work on pre-natal behavior in the vertebrate phyla with a bibliography of 354 references. The neonate is discussed by Karl C. Pratt and the general problem of the maturation and patterning of behavior by Arnold Gesell. Developments in special fields are considered *in extenso:* locomotor and visual-manual functions by Mary Shirley, emotion by Mary Cover Jones, mental growth by Florence Goodenough. Beth Wellman presents the available material on sex differences in non-critical review. Problems of speech pathology are discussed in an extremely useful paper by Lee Travis. W. E. Blatz has an original contribution to the problems of development and training of the "physiological

appetites," viz., hunger, thirst, elimination, rest, change, and sex. While this paper is not a review a useful bibliography of 100 titles is appended. Among the studies of special groups Phyllis Blanchard discusses the child with difficulties of adjustment and Leta Hollingworth the adolescent.

Papers on methodology, language, social behavior, environmental forces (Lewin), learning, morals, philosophies, order of birth, eidetic imagery, the gifted, feebleminded and primitive child, and the child with special gifts and deficiencies are by the same authors as in the first edition. Of these papers all have been rewritten and enlarged both in text and bibliography except those on philosophies (Piaget), eidetic imagery (Klüver), the feebleminded (Pintner), and the primitive child (Mead) in which there has been little or no change.

The papers on eating, sleeping and elimination (Woolley), optimal environments (Isaacs), twins (Gesell), relation between mental and motor development (Wellman), play, games and amusements (Marshall), dreams (Kimmins), and psychoanalysis (A. Freud) which appeared in the first edition have been omitted here. The first and last of this list have been more or less replaced by the articles of Blatz and Blanchard respectively.

While it is impossible to evaluate each paper separately in this review we can say of the work as a whole that it has been much improved editorially; the papers are more logically arranged, they are of more even quality, and they are better quantitatively and qualitatively. In this volume we have adequate summaries of those topics in child psychology in which the greatest experimental interest has been shown. Those who have used the first edition will be forced to use the second because it so entirely replaces the former, and those who are not familiar with the earlier edition can well forego it in favor of the second.

The appearance of the so entirely changed second edition the editor says, "is due chiefly to the great expansion of the field during the last three years and partly to the improved insight of the Editor." The evidence of the reviews which appear in both volumes demonstrates that the field is growing rapidly. Nevertheless the topics covered in new papers contrasted to those omitted indicate an even greater growth in editorial insight. Let us hope the present volume will stand as an adequate summary for the next five or ten years at least. The appearance of a third edition within five years would be more like the overworking a good commercial venture than a needed contribution to scientific literature.

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SEASHORE, C. (Editor.) *The Vibrato. Studies in the Psychology of Music.* University of Iowa Studies, Iowa City, 1932, Vol. 1, pp. 382.

This is the first volume of a series that will be devoted to the psychology of music. The present number is a complete account of experimental investigations of the vibrato up to 1932.

The study of the vibrato began in 1921 and has continued to the present state of exact measurement with the development of instruments for measurement. The most important instruments are probably the oscillograph and the strobophotograph which when used together give a film record of pitch, intensity, and timbre changes during the vibrato as well as the number of vibrato pulsations per second.

Some of the main conclusions from the eleven studies presented in this volume are: (1) the vibrato is present about 95 per cent of the total singing time with vocal artists of the calibre of Ponselle, Caruso, Galli-Curci, Schumann-Heink, and Chiliapin, and is therefore an accepted and desirable artistic embellishment; (2) the vibrato is found on sustained notes of practically all well known stringed artists as frequently as with vocal artists and it is generally found in all instruments within the mechanical and physiological limits of the instrument and player; (3) the average extent of the vocal pitch vibrato is about a semi-tone; for stringed instruments such as the violin, 'cello, and viola, it averages one-quarter of a tone; (4) the average number of vibrato pulsations per second is about 6.5, being the same for vocalists and stringed instrumentalists.

An important contribution is made to applied psychology of music by Wagner who describes a technique for developing a desirable vocal vibrato, and methods for correcting either an undesirable retarded or accelerated rate of vibrato.

The vibrato is a valuable contribution to the new field of the psychology of music and it is hoped that this and other volumes will help to bridge the unfortunate gap between musicians and scientists to their mutual benefit and understanding.

MURSELL, J. L., and GLENN, MABELLE. *The Psychology of School Music Teaching.* New York, Silver Burdett, 1931, pp. 378.

This book has been carefully prepared for the teacher and supervisor of music in our public school systems. All research in the psychology of music has been brought together for the first time and presented in an attractive and practical form. Appreciation of music either as executant, creator, or listener is the

objective of all musical education rather than the production of virtuosi. The contributions of psychology to musical learning, motivation, appreciation, technique, expression, and testing are clearly shown in a way that will help the teacher make them function. Most music teachers will feel the need of changing their pedantic classical methods of teaching after reading this sound book and every music teacher should become intimate with the psychological principles the authors have applied to musical education.

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Macon, Ga.

## NEW BOOKS AND PAMPHLETS

Books and pamphlets for review should be sent to James P. Porter, Editor, Journal of Applied Psychology, Ohio University, Athens, Ohio.

*An Attempt to Predict the Success of University Freshmen in Their Adjustment to Scholastic Work.* OMAR C. HELD. Edwards Brothers, Ann Arbor, Michigan. 50 pp.

*The Ape and the Child.* W. N. KELLOGG and L. A. KELLOGG. McGraw-Hill Book Company, New York, 1933. $3.00. 341 pp.

*The California Behavior Inventory for Nursery School Children.* HERBERT S. CONRAD. University of California Press, Berkeley, California, 1933. 75 cents. 75 pp.

*The California First-Year Mental Scale.* NANCY BAYLEY. Institute of Child Welfare, University of California Press, Berkeley, California. 50 cents. 24 pp.

*Dementia Praecox.* HARRIET BABCOCK. Science Press Printing Company, Lancaster, Pa., 1933. 167 pp.

*District Organization and Secondary Education.* FRED ENGELHARDT, W. H. ZEIGEL, WILLIAM M. PROCTOR, SCOVEL S. MAYO. National Survey of Secondary Education, Bulletin No. 17, 1932. United States Government Printing Office, Washington, D. C. 15 cents. 208 pp.

*Educational Psychology.* WILLIAM A. KELLY. Bruce Publishing Company, New York, 1933. $2.40. 501 pp.

*The Emotional Responses of Children to the Motion Picture Situation.* WENDELL S. DYSINGER and CHRISTIAN A. RUCKMICK. Macmillan Company, New York, 1933. $2.00. 285 pp.

*A Hundred Years of Psychology.* J. C. FLUGEL. Macmillan Company, New York, 1933. $3.75. 384 pp.

*Hypnosis and Suggestibility.* CLARK L. HULL. D. Appleton-Century Company, New York, 1933. $3.75. 416 pp.

*Insanity as a Defense in Criminal Law.* HENRY WEIHOFEN. Commonwealth Fund, New York City, 1933. 525 pp.

*Life in The Making.* ALAN FRANK GUTTMACHER. Viking Press, New York, 1933. $2.75. 297 pp.

*The Logic of Science.* WILLIAM G. BALLANTINE. Crowell Publishing Company, New York, 1933. 230 pp.

*The Maze Test and Mental Differences.* S. D. PORTEUS. Smith Printing and Publishing House, Vineland, N. J. 212 pp.

*Motion Pictures and Youth.* W. W. CHARTERS. Macmillan Company, New York, 1933. $1.50. 102 pp.

*Motion Pictures and Youth.* SAMUEL RENSHAW, VERNON L. MILLER, and DOROTHY P. MARQUIS. Macmillan Company, New York, 1933.

*660 Runaway Boys.* CLAIRETTE P. ARMSTRONG. Richard G. Badger, Boston, Mass., 1932. $3.00. 208 pp.

*Studies in Expressive Movement.* GORDON W. ALLPORT and PHILIP E. VERNON. Macmillan Company, New York, 1933. 269 pp.

*Studies in the Psychology of Art.* NORMAN C. MEIER. Psychological Monographs, Vol. XVI, No. 1. Psychological Review Company, Princeton, N. J. 188 pp.

*The Way of All Women.* M. ESTHER HARDING. Longmans, Green & Company, New York, 1933. $3.00. 335 pp.

*Women in the Twentieth Century.* SOPHONISBA P. BRECKENRIDGE. McGraw-Hill Book Company, New York, 1933. $4.00. 364 pp.

*Workbook in Educational Psychology.* A. E. BROWN. The Macmillan Company, New York, 1933. $1.35. 226 pp.

*A Workbook in Educational Psychology.* HARVEY C. LEHMAN and STUART M. STOKE. Prentice-Hall, New York, 1933, 80 cents. 152 pp.

## Directory of American Psychological Periodicals

*(Continued)*

**Psychological Abstracts**—Eno Hall, Princeton, N. J. American Psychological Association. Subscription $6.00. 700 pages ann. Edited by W. S. Hunter. Monthly. Abstracts of psychological literature. Founded 1927.

**Pedagogical Seminary and Journal of Genetic Psychology**—Worcester, Mass.: Clark University Press. Subscription $14.00 per annum; $7.00 per volume. 1,000 pages annually (2 volumes). Edited by Carl Murchison and an international cooperating board. Quarterly. Child behavior, animal behavior, and comparative psychology. Founded 1891.

**Journal of Social Psychology**—Worcester, Mass.: Clark University Press. Subscription $7.00. 500-600 pages annually. Edited by John Dewey and Carl Murchison. Quarterly. Political, racial, and differential psychology. Founded 1929.

**Personnel Journal**—Baltimore: The Williams & Wilkins Co. Subscription $5.00. 500 pages, approximately. Edited by Walter V. Bingham. Bi-Monthly.

**Mental Measurement Monographs**—Baltimore: The Williams & Wilkins Company. Subscription $5. 400 pages annually. Edited by Knight Dunlap and Buford Johnson. Published without fixed dates, each number a single research. Founded 1925.

**Studies in Psychology and Psychiatry**—Baltimore: The Williams & Wilkins Company. Subscription $5.00. 400 pages annually. Edited by Edward A. Pace. Published without fixed dates, each number a single research. Founded 1926.

**Journal of Philosophy**—New York: 515 West 116th Street. Subscription $4.00. 728 pages per volume. Founded 1904. Bi-weekly. Edited by F. J. E. Woodbridge, Wendell T. Bush, and H. W. Schneider.

**Child Development**—Baltimore, Md.: Williams & Wilkins Company. Subscription $5.00. 400 pages annually. Edited by Buford Johnson. Quarterly. Founded 1930.

**Character and Personality**—Durham, N. C.: Duke University Press. Subscription $2.00 per annum. Quarterly. Edited by Robert Saudek (London) and Ernest Seeman (Durham, N. C.). Founded 1932.

## Directory of American Psychological Periodicals

**American Journal of Psychology**—Ithaca, N. Y.: Cornell University. Subscription $6.50. 624 pages annually. Edited by M. F. Washburn, K. M. Dallenbach, M. Bentley, E. G. Boring. Quarterly. General and experimental psychology. Founded 1887.

**Journal of General Psychology**—Worcester, Mass.: Clark University Press. Subscription $14.00 per annum; $7.00 per volume. 1,000 pages annually (2 volumes). Edited by Carl Murchison and an international cooperating board. Quarterly. Experimental, theoretical, clinical, and historical psychology. Founded 1927.

**Psychological Review**—Princeton, N. J.: Psychological Review Company. Subscription $5.50. 540 pages annually. Bi-monthly. General Psychology. Edited by Howard C. Warren. Founded 1894.

**Psychological Monograph**—Princeton, N. J.: Psychological Review Company. Subscription $6.00 per vol. 500 pp. Ed. by Raymond Dodge. Published without fixed dates, each issue one or more researches. Founded 1895.

**Psychological Index**—Princeton, N. J.: Psychological Review Company. Subscription $4.00. 300-400 pp. Edited by W. S. Hunter. An annual bibliography of psychological literature. Founded 1895.

**Psychological Bulletin**—Princeton, N. J.: Psychological Review Company. Subscription $6.00. 720 pages annually. Psychological literature. Monthly. Edited by Edward S. Robinson. Founded 1904.

**Archives of Psychology**—New York: Columbia University. Subscription $6. 500 pp. ann. Ed. by R. S. Woodworth. Published without fixed dates, each number a single experimental study. Founded 1906.

**Journal of Abnormal and Social Psychology**—Eno Hall, Princeton, N. J. American Psychological Association. Subscription $5. Foreign, $5.25. Editor, Henry T. Moore. Quarterly. 448 pages annually. Abnormal and Social. Founded 1906.

**Psychological Clinic**—Philadelphia: Psychological Clinic Press. Subscription $3.00. 288 pages. Ed. by Lightner Witmer. Without fixed dates (9 numbers). Orthogenics, psychology, hygiene. Founded 1907.

**Psychoanalytic Review**—Washington, D. C.: 3617 10th St., N. W. Subscription $6. 500 pages annually. Psychoanalysis. Quarterly. Ed. by W. A. White and S. E. Jelliffe. Founded 1913.

**Journal of Experimental Psychology**—Princeton, N. J. Psychological Review Company. 500 pages annually. Experimental. Subscription $6.00. Bi-monthly. Edited by S. W. Fernberger. Founded 1916.

**Journal of Applied Psychology**—Indianapolis: The C. E. Pauley & Co., Inc. Subscription $5.00. 600 pages annually. Bi-monthly. Edited by James P. Porter, Ohio University, Athens, Ohio. Founded 1917.

**Journal of Comparative Psychology**—Baltimore: The Williams & Wilkins Co. Subscription $5.00 per volume of 450 pages. Three volumes every two years. Edited by Knight Dunlap and Robert M. Yerkes. Founded 1921.

**Comparative Psychology Monographs**—Baltimore: Johns Hopkins University Press. Subscription $5. 400 pages per volume. Knight Dunlap, Managing Editor. Published without fixed dates, each number a single research.

**Genetic Psychology Monographs**—Worcester, Mass.: Clark University Press. Subscription $7.00 per volume. Two volumes per year, 600 pages each. Edited by Carl Murchison. Monthly. Each number one complete research. Child behavior, animal behavior and comparative psychology. Founded 1925.

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